

doctors towards these patients who are not familiar with all the aspects of this problem might endanger the patient's life.

#### REFERENCES

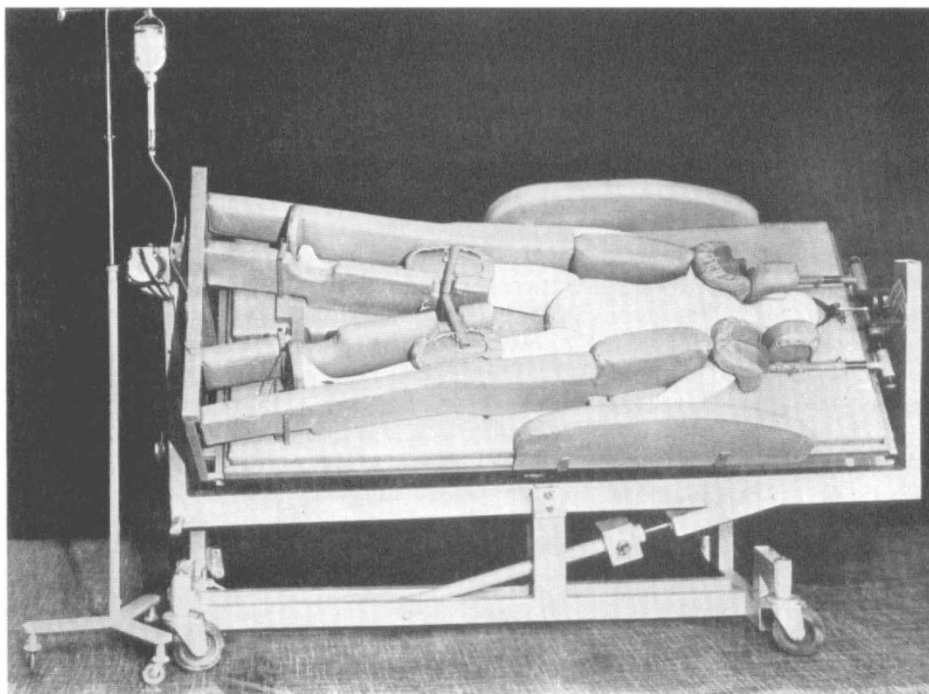
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### ROTO-REST

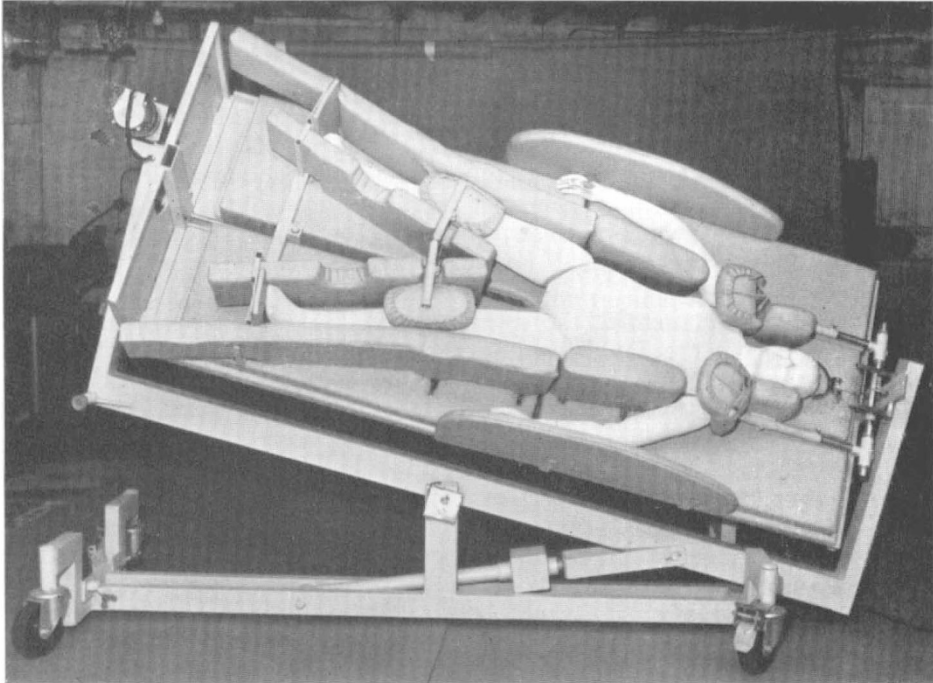
By F. KEANE, M.B., B.S.

*National Rehabilitation Centre, Dublin*

THIS bed has been designed to introduce automation into the nursing of severely disabled patients. It makes possible improved nursing care which hitherto was not practical or economical, and facilitates medical examination and specific therapy of these patients. The Roto-rest is primarily intended for use in the treatment of spinal injuries, with or without the complication of paraplegia or quadriplegia and also for head injuries and orthopaedic cases. It may also be used to great advantage for the chronic patient at home.



The standard Roto-rest is remarkably simple in construction, and is no longer than the standard hospital bed fitted with skull traction equipment, it is 3 feet overall in width, and 8 feet in length. In the horizontal position the patient is at a convenient height, being 41 inches above the floor level. This size of bed will take a patient varying in stature from 4 feet 10 inches to 6 feet 3 inches, including the distance required to accommodate a conventional skull traction tongs, and special traction assembly. The bed consists basically of three parts. A ground frame with four braked 6-inch castors. This frame has two upright pillars on which a



U-frame rocks longitudinally to provide varying degrees of head and foot inclination. The foot of the U-frame may be clamped in bearings on the ground frame a foot-end and by activating a jack, mounted between the ground frame and this U-frame, the U-frame may be elevated so that the patient can be put in a standing position if desired. The bed proper is pivoted at either end on the U-frame, so that rotation about the longitudinal axis is achieved. The surface of the bed is divided into hatches which may be opened independently. These are situated under the patient's legs, arms and centrally under his head and neck, thorax and buttocks. The hatch situated in the thoracic region carries a spring-steel section which permits adjustment, so that the lumbar and thoracic spine may be supported, or extended at any position along its length. In place of a conventional mattress, plastic-covered removable foam plastic sections are used. Upright removable members are fitted, which extend from the axilla to the foot of the bed, and may be contoured to the individual patient by the surgeon, to afford lateral support. Adjustable head, shoulder, knee, and foot supports are also provided. Skull

traction is available, from 0 to 56 lb., by a constant tension spring system, which is concealed within a frame member of the bed. Conventional bed clothes are dispensed with, and an air blower in the foot of the bed may be provided. The patient is placed on the bed, and all parts of the bed are adjusted to the surgeon's satisfaction. This usually takes about five to ten minutes. The patient never again has to be manually lifted for the full duration of his treatment. Nursing care may be carried out by one person alone through the hatch system and removable sections of the bed.

A short description of the functions of the bed is tabulated below in order of importance.

(1) *Automatic Turning of the Patient.* The bed may be programmed to carry out turning of the patient through a preselected number of degrees up to 160, as a continuous motion, or executing one turn at 10-, 15-, or 30-minute intervals. The optimum speed of rotation has been established at 35° per minute. In the event of electrical failure the patient may be turned by one person without effort through 160° in 6 seconds. The patient may turn himself through any desired number of degrees and stop the bed in a desired position by a press button, provided for his use, and may simply switch on to AUTO CONTROL for hours of sleep. In the event of electrical failure the patient, if he has the use of his arms, may turn the bed manually himself.

(2) Correct alignment of the spinal column, and continuous skull traction, are provided at all times for the full duration of treatment, even when the bed is working on the AUTO CONTROL.

(3) A continuous venous blood flow, particularly in the lower limbs is maintained to avoid the complication of venous thrombosis.

(4) A full range of joint movements of upper and lower limbs can be achieved by the physiotherapist with the patient in the horizontal recumbent position by the use of the hatches, which means that she does not have to turn the patient to complete a full treatment and gravity may be used to assist in achieving extension of the hip joint.

(5) The placing of a patient with head or foot elevated through 15° is carried out by activating the jack.

(6) The patient may be placed in a standing posture for re-education of vascular system at 80° with the horizontal, and when in this position his weight is taken on the foot supports.

(7) The Roto-rest may continue to execute automatic turns and traction may be maintained while operations (4) and (5) are executed.

(8) Toilet care is carried out through the rectal hatch and continuous catheter drainage, or the use of the 'Urovac' are facilitated through an opening in the hatch. Reflux of urine into the bladder is discouraged due to the position of the drainage tube and urine container when replacing the full container.

(9) Conventional bed-clothes are dispensed with, and the bed is washed and dried at the same time as the patient's bath is carried out. This avoids all laundry expense and bed-making, and tends towards a greater hygiene in the ward. Disposable paper sheets are placed only under the patient's head, thorax and buttocks, without movement of the patient, as all areas of the body are easily accessible for this purpose. Conventional bed-clothes may be used as a top cover if desired, and if so are held on by clips.

(10) The patient is retained in the bed by the removable shoulder and knee

clamps only, thus avoiding any embarrassment of respiration. These clamps also serve to maintain proper posture of the lower limbs and control involuntary spastic movements.

(11) The clamps prevent a confused or agitated patient injuring himself by movement or climbing, or falling out of bed.

(12) A patient while secure in the bed is able to move his hands and arms freely to feed himself, read, etc., but due to the design of the shoulder clamps he cannot interfere with the head traction assembly.

(13) While the patient has a desirable freedom of movement of his upper limbs, he is prevented from reaching and removing his catheter, if one is *in situ*, due to the height of the side supporting members.

(14) Ventilation of the skin is achieved as the bed is turning, usually in continuous motion, thus avoiding constant skin contact with the weight-bearing surfaces.

(15) Patient's temperature control is possible by a variable-speed air blower situated in the foot of the bed. As the patient turns, practically all areas of his body become exposed alternatively to the air flow which it produces, thus avoiding the use of hypothermic drugs, ice drips, etc.

(16) Continuous intravenous infusion is more easily maintained, because accidents caused by handling of the patient for turning are obviated, and the tendency to thrombosis in the veins is reduced.

(17) A red warning light indicates to the nursing staff that the bed is in motion. If this light is not visible, the cause must be investigated. If desired, a no-volt alarm may be fitted, which will alert the staff or awaken the patient if an electrical failure results and thus is of importance, particularly where the bed is intended for home use.

(18) Variable abduction of the patient's legs is possible to enhance the venous return when rotating, as each leg is alternately elevated and depressed.

(19) Facility to position X-ray plates is incorporated to take films in any posture of the head, neck and trunk, without lifting the patient.

(20) Spring leg traction may be fitted up for treatment of fractures of lower limbs.

#### ADVANTAGES FOUND ON CLINICAL TRIAL

(1) Medical officer's time is saved, as any part of the patient's body is immediately accessible for examination and treatment.

(2) The physiotherapist can carry out a full range of joint movement of the limbs while the patient is in the recumbent position, and can make use of gravity to effect extension of the hip joints. Patients can be put in any posture for chest physiotherapy, etc.

(3) Nursing is reduced to bed bathing, toilet care and administering drugs. No bed making is required.

(4) Bed sores do not occur.

(5) Venous thrombosis in the lower limbs has not occurred in any patient nursed on the bed so far.

(6) Flexion contractures from spasticity are prevented.

(7) Clinical trial has shown that practical immobilisation of spinal fracture is

achieved, and correct alignment traction possible during continuous automatic turning.

(8) Marked relief of pain at fracture site has been observed.

(9) Chest complications in susceptible patients have not appeared, and patients who already have contracted chest infections improved rapidly when put on the bed. This is an outstanding advantage to paraplegics and quadriplegics, who may suffer greatly from respiratory embarrassment.

(10) It has been noted that when carrying out intermittent catheterisation sediment has not been allowed to form, or if so is minimal.

(11) Prolonged intravenous infusion has been easier to maintain, as clotting tendency and accidents are reduced.

(12) Urinary reflux cannot occur as the orderly cannot lift the bottle higher than the patient because the drainage tube comes out through the hatch under the middle of the bed, and not over the side, which is the case in standard practice.

(13) It has been noted in some patients that constipation and nausea have set in when they were transferred to conventional beds.

(14) Noise in the ward at night time, caused by personnel, is eliminated, and the patients may have an undisturbed night's rest.

(15) A turning speed of 35° per minute is a speed at which the patient is unaware of the turning motion and yet is fast enough to ensure adequate blood flow in the limbs.

(16) Another minor advantage is that the patient does not suffer from sore ears, which may be a problem on conventional beds. The patient also has a changing field of vision as he turns.

(17) Embarrassment to the patient is avoided when having to use a bed pan as no stripping of the bed is required.

There is a possibility that using this bed a device could be used to handle faecal incontinence. This is under consideration at the moment.

### Discussion

Dr. A. HARDY (*Great Britain*). Thank you, Dr. Keane. Now the meeting is open for question and discussion.

Dr. D. GUREVITCH (*U.S.A.*). I would like to have a few questions. 1. Is that last bed commercially available? How much does it cost?

2. We have heard a good deal in South Africa about the separation of the races. Could I ask how many whites and how many coloured patients were involved?

3. I am amazed, or not amazed, at the enormous difference between the first and the second report which covered essentially the same subject, with such different methods and therapeutic procedures and figures, and seemingly such different results.

Dr. MEINECKE (*Germany*). When I gave my paper on the treatment of broken limbs, Dr. Cheshire from Australia told me that nobody concerned with the treatment of paraplegics will use any plaster casts in the future. Dr. Cibeira told us that a lot of his patients were treated with plaster casts. I would like to ask him, What are the reasons, results, how many complications—pressure sores, what about the alignment of the fracture, and how many stiffness and circulatory troubles did he have?

I think we have a very good method for treating fractures now with ostentesis and you can move the leg or arm, and this is without stiffness and no harm to the skin.