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DESIGN AND DEVELOPMENT OF A PATIENT TRANSFER MECHANISM

KEYWORDS: Mobility Aid, Patient Transfer, Stretcher Trolley, Accident Spot Safety.

Dr.M.S. Rohokale
Head of Mechanical Engineering Department Sinhgad Institute of Technology, Lonavala

Bakul Shinde
Department of Mechanical Engineering Sinhgad Institute of Technology, Lonavala

ABSTRACT *InIndiathenumberofdisabled / injuredindividualsisincreasingeveryyear.Mobilityaidsareusefulforpatientsfortransportation during accident cases. Stretchers arethemostcommonlyusedmedicalequipmentforthetransportationofpatients.Transferringthepatientsfrom stretchertothemedicalbedisalwaysanissuefortheattendantornurse. Understandingthevarious issuesregardingthemobilityequipmentandintroducingabetterdesignwillbeanassetforthemedicalfieldanda helpinghandfordisabledindividuals.Thereisaneedforastretchertofacilitatethedisabledpatient's mobility and to provide novel medical equipment for use in the Indian hospitals.*

Newfeatureslike height adjustable,Documentholder,provisionforoxygencylinder,androtatablehandleshould beintroduced and the stretcher should be made user friendly. Our study shows that it is possible tosavethe tedious task of handling the patients carefully.Theproductwillthuslikelybeanefficientmobilityaidin hospitals.

INTRODUCTION

CURRENT SCENARIO

In India the number of accidents is increasing every year. Transferring the patients from the accident site to the hospital has always become an issue. The patient handling becomes a very tedious task for the nurse or attendant especially when there are multiple injuries. Adopting various kinds of research methods helped to obtain more information about hospital mobility aids and for data collection. It has been observed that every year the numbers of disabled individuals are increasing by different kinds of accidents. Presently wheelchairs and stretcher are the commonly used mobility aid for indoor and outdoor purpose. [1]

Currently in India, A bed sheet or a Resin sheet as shown below is used to transfer the patient from the accident spot to the stretcher since the accident spot becomes inaccessible at times. This Resin Sheet is always kept on standby in all the ambulances in India

Fig 1: patient taken out in bedsheet.

Fig 2: Resin Sheets in Ambulance

PROBLEM STATEMENT

Stretchers, chairs, and wheelchairs are the primary means of transporting patients in emergency departments. Stretchers are frequently used to transport patients in the accident spots. Safety and comfort of the patient are important. Today, number of available persons per patient is showing a decreasing trend. The transfer of these immobile patients from Accident spot to bed is a delicate process and in most of the instances, three or more persons are required. However, it is estimated that 1 in 3 develop will develop back injuries. Most injuries occur because the patient is relatively heavy to lift and access to them is difficult when attempting to place the patient onto another bed.

This poses a need for improving the available support devices to ease the effort for transferring the patient from Accident spot to the hospital without manual intervention.

It is important that patients should be easily transferred to a stretcher with a minimal amount of movement; thus, an appropriate stretcher makes the job easier for the medical personnel. [1]

2. LITERATURE REVIEW

Following are some of the various Equipment which are

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used as a stretcher for transferring the patient to the Hospital bed.

CEILING LIFT MECHANISM

Fig 3: Ceiling lift Mechanism

CONVENTIONAL STRETCHER

Fig4: Conventional Stretcher

Fig5: Conventional Stretcher in an Ambulance.

2.3 CONVENTIONAL SHEET

Fig 6: Conventional Sheet used as a Stretcher.

By using any of the above Stretchers it becomes very difficult to handle the patients while transferring from the Stretcher to the Hospital bed. If the patient sustains multiple injuries or fractures then transferring the patient to the Hospital bed becomes a very tedious task involving a number of person and very smooth handling.

Taking into considerations the various disadvantages of the above stretchers a New Proposed Stretcher can be designed which can eliminate the transfer of patient from twice to just once i.e. from the Accident spot to the Stretcher Trolley.

PROPOSED STRETCHER
HEIGHT ADJUSTABLE SCISSOR SYSTEM.

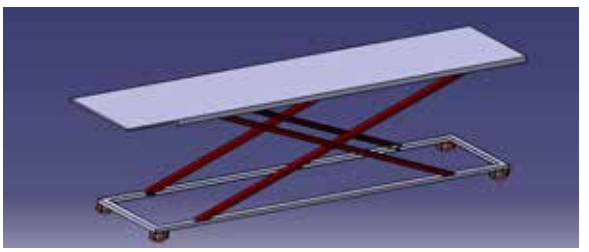

Fig7.a: Scissor Mechanism.

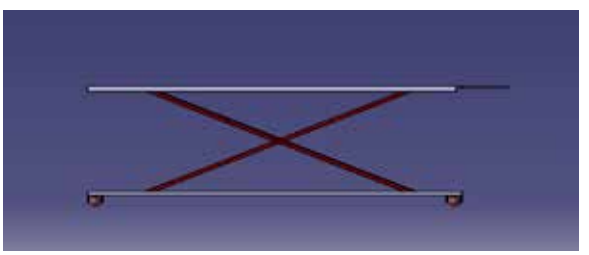

Fig7.b: Scissor Mechanism.

A Simple Scissor Mechanism will be used to adjust the Height of the Stretcher bed with the help of a Power screw which can be turned automatically or with the help of a handle as shown in the figure below.

Fig8: Hinged at one end and Roller at the other end

One end of the Stretcher will be hinged and the other end will be attached to a roller. When the Bed is at the topmost level, the Linkages will be at the closest position as shown in the figure above. As the level of the bed decreases the linkages will move at the extreme end positions.

Advantages

- Height can be easily adjusted.
- Only one person required.
- Physical Handling and proper balancing of Patient.

HORIZONTAL ROLLER SYSTEM

For transferring the patients from the Stretcher trolley to the Hospital Bed, A Horizontal Roller Mechanism will be used as illustrated below.

Volume : 5 | Issue : 3 | March 2015 | ISSN - 2249-555X

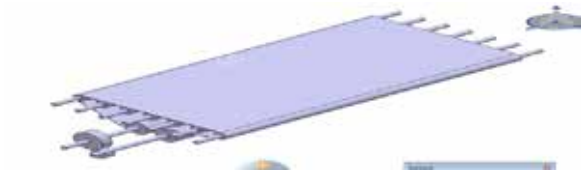

Fig 8: Horizontal Transferring Mechanism

An Electrically driven Pulley can be used for operating a belt drive with the help of idler rollers. It can also be hand driven with the help of a rotatablehandle.

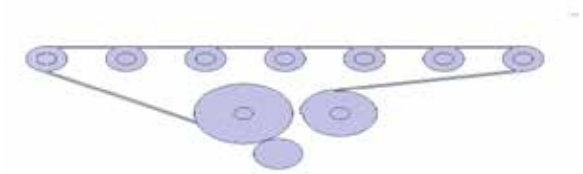

Fig9: Idler Rollers driving through Motor

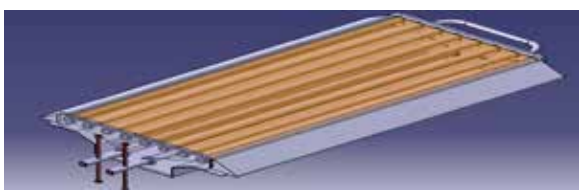

Fig10: Idler Rollers

Fig11: Bed Model

Cross Mechanism (Scissor Mechanism)

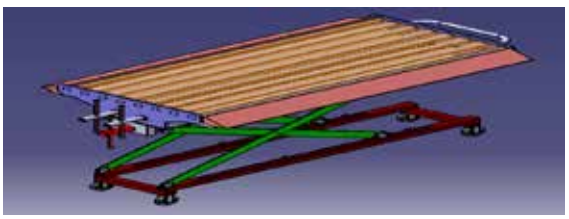

Fig12: Cross Mechanism Model

CONCLUSION

For safety of the patient, the manual handling of patient should be totally eliminated. If Automatic transfer of patient, with adjustable height is made available, then the patient will have to be handled only once i.e. to transfer from the Accident spot to the Stretcher trolley, the patient will not be required to be handled manually further. A pneumatic or hydraulic system may be arranged instead of mechanical linkage for height Adjustment.

REFERENCE

[1.] Design and Development of conceptual Wheelchair cum Stretcher,Sreerag C S, Gopinath C, ManasRanjan Mishra. Department of Design, M. S. Ramaiah School of Advanced Studies, Bangalore 560 058