



## Modeling of Modified mattresses for patient handling in Hospital

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### Abstract

*In present searching, we see that in maximum hospital, transfer of patient from one place to another place that time require more labor work. At the time of patient handling, patient and hospital staff suffers from many problems like stresses are produced in the body, some time it happens that sleep down the patient. It is required to eliminate all types of possibilities*

*The present working proposes a design and development of modified mattresses for patient handling. By using such type of modification we can easily transfer the patient in various places. we totally eliminate the problem occur at the time of handling of patients. Before the design & development we do the modeling of modified mattresses. By using 3D catia software we can see how the work will perform in hospital.*

**Keywords:** - Modified mattresses, Stretcher, Hospital bed

### 1. Introduction

In hospital we see that for the various checkups, patient transfer from one place to another place. As per the demand required the better living quality of immobilized patients, for that should be improved the hospital mattresses accordingly. Generally immobilized patients transfer by nursing staff. Transfer of patients in various places is a labour intensive work. It is very dangerous for patient and staff, if all transfer activity not done in appropriate manner. Most of the hospitals use fully atomized beds & stretcher for the patient handling. These are very costly and cannot be affordable to all the hospital. At the time of handling of patient The stresses developed in both i.e. patient & staffs are same for all the hospital. Our aim is that to provide a better solution for transfer of patient.

According to survey in hospital, found that, 38% of nursing staff suffers work from back injuries , 12% of nursing staff suffer from low back pain at average age 39. Any other Nursing staffs suffer from any other various injuries.

The present working proposes Assembly of a new trolley cum stretcher along with the modified

mattresses which will totally eliminate the handling of immobilized patients.

### 2. IDENTIFICATION OF PROBLEM

#### 2.1 Present Method of Patient Handling

The patient transfer from various places like from Ambulance to O.T./ ICCU/X-ray centers /MR scan / Sonography can be proceed through various stages.

##### 2.1.1 From accident spot to stretcher:-

Patient Transfer from accident spot to stretcher when accident is happen .

##### 2.1.2 Stretcher to ambulance:-

The patient move from stretcher to ambulance by using three to four persons.

##### 2.1.3 Ambulance to hospital stretcher:-

When patient come in hospital after accident after that patient transfer from ambulance to stretcher by using man power.

##### 2.1.3 Stretcher to bed at O.P.D.:-

After that Patient transfer from ambulance to O.P.D. ward by using stretcher with the help of three to four persons.

##### 2.1.4 O.P.D to ICCU/ward bed:-

Then after Patient transfer in other places by using Stretcher with the help of labour as per The requirement like O.P.D.to ICCU/Ward Bed.

##### 2.1.5 From O.P.D. to X-Ray centre / MRI / SCAN / Pathology centre :-

Then after Patient moved from one place to another for checkup like O.P.D. to X-Ray centre/ MRI / SCAN / Pathology centre.

##### 2.1.6 Back to the bed of ICCD/Ward bed :-

The patient is move back by following reverse above Steps.

### 2.2 Present method of Patient handling from Ambulance to stretcher

**Step I:-****Step II:-****Step III:-****Step IV:-**

Fig1:- present method of patient transfer

This is the general method which is adopted in hospital when accidental case comes.

### 3. The Problem Associated with above Patient handling

- 3.1 When the patient is required to transfer on the same floor, he is wrapped in cotton bed sheet and lifted by three to four labour . Due to the handling, stresses are developed in the body of both i.e. patient as well as the nursing staff. Some time cramp may be produced in backbone and other parts of the body.
- 3.2 At the manual handling of the patient various accessories like blood transmission facility, oxygen supply, saline facility, are not available and this may create various problem if the patient is serious.
- 3.3 When the patient is to be moved from one place to another place, that time if the movement of the patient is on inclined plane and during this movement, there is a chance that the patient may slip or slide down on stretcher.

The above problems which is generated at the timing of patient handling which can be eliminated by developing a new trolley to handle the patients and modifying hospital bed.

### 4. FORMULATION OF PROBLEMS

As per the demand of safely transferring of patient and for better living quality of patients we can modified the hospital mattresses. Transferring of unmovable patients is usually the work of labour. Transfer of patients in various places is a labor intensive work and which is very dangerous for patient, if inappropriate handling is not done. For safely transferring of patient we proposed the following assembly of trolley cum stretcher and modified mattresses.

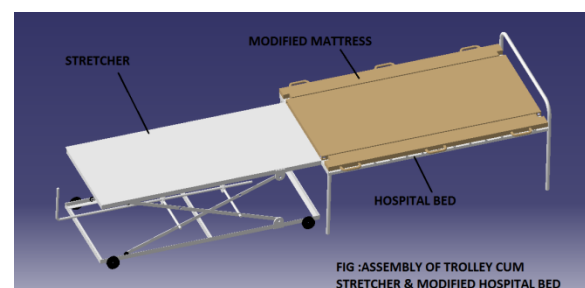


Fig 2: Assembly of trolley cum stretcher and modified Mattresses

To transfer the patient from trolley to hospital bed following procedure is adopted.

**Step-I-**

Bring the trolley to near the hospital bed and match the level with hospital bed by using scissor mechanism and screw jack mechanism.

**Step-II-**

When levels is form then after take the patient with new modified mattress from stretcher.

**Step-III-**

When patient take with modified mattress from stretcher, then after patient settle down on hospital bed with modified mattress.

**Step-IV-**

The same procedure can be used for transfer of patient.

**4.1 Trolley cum stretcher**

By using such type of stretcher we can done the up-down movement of stretcher. Due to such type of arrangement we can easily match the level of stretcher with the hospital bed. In this we provide the scissor mechanism with screw jack mechanism. Scissor mechanism is used to adjust the height of Trolley.

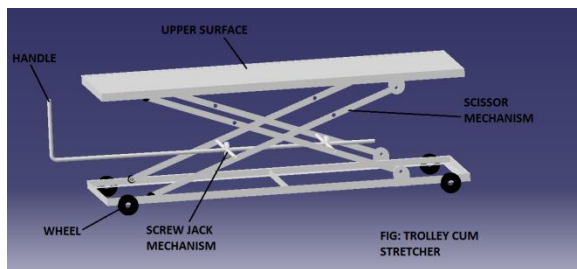


Fig 3 : Trolley cum stretcher

The clockwise rotation of handle increases the height of trolley. This whole mechanism plays the role of a typical lead screw mechanism used to lift heavy weight to considerable height. The height of trolley is required to be adjusted according to the height of hospital bed/ sonography bed /operation table bed.

**4.2 Modified Hospital Bed**

The main aim of design of trolley cum stretcher and modified hospital bed is to eliminate the manual handling of patient. In this we use the slandered frame of hospital bed.

In this we use the modified stretcher. For the modification of the mattress we used the layer of foam and aluminum square tube. In this aluminum square tube play the very important role. Due to aluminum square tube mattress cannot form sagging. It maintains the straightness of mattress.

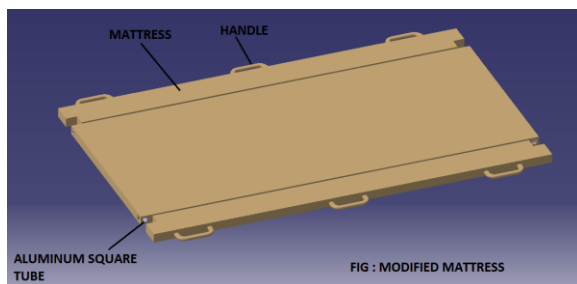
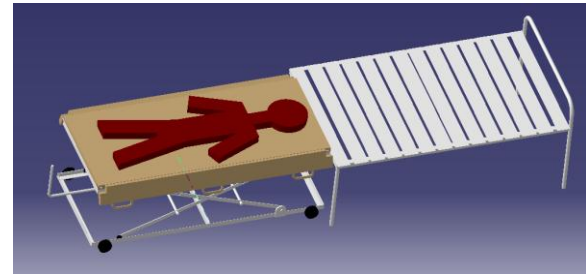


Fig 4 : modified mattresses

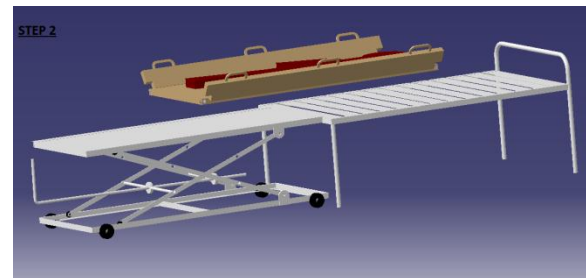
As per the safely transfer of patient from bed to stretcher we modified the mattress by using aluminum square tube. As per the requirement mattress should be light weighted.

**4.3 Step of working**

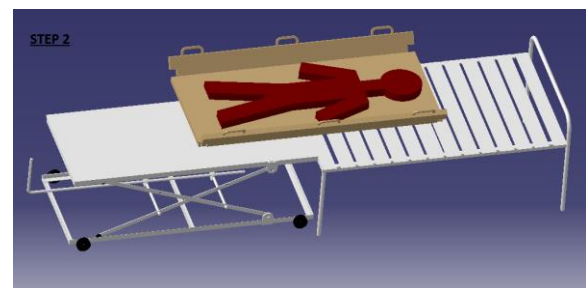
By using modified assembly we can transfer the patient as per following step wise -

**Step 1**

In step 1 we see that patient sleep on stretcher. By using scissor mechanism match the height of stretcher with modified hospital bed.

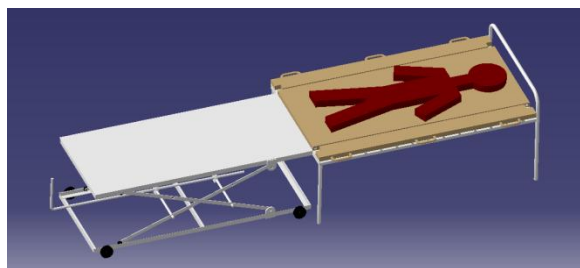
**Step 2.1 (Front view)**

In step 2.1, we see that patient take from stretcher with modified mattress. By using modified mattress we can lift the patient with any disturbance.

**Step 2.2 (Top view)**

In step 2.2 we see the top view after patient lift from stretcher.

### Step 3



In step 3 we see the patient completely transfer from stretcher to hospital bed by using modified mattress.

Fig 5: Patient transfer by using modified Mattresses  
In such way as per the described following stages we can transfer the patient safely without any disturbance to the patient from one place to another place.

## 5. Conclusion & further suggested work

### 5.1 Advantages of Trolley cum Stretcher & Modified mattresses

- 1) It will minimize the problem occur during patient handling
- 2) It will reduce stresses produced in nursing staff

### 5.2 Limitations of Trolley cum Stretcher

- 1) The cost of this project will be high initially because required to replace all the conventional hospital bed with new one.
- 2) Extra care has to take at the time of patient transfer.

### 5.3 Conclusions

As per the above information we concluded that now day Maximum hospitals are using fully atomized beds & stretcher for the patient handling. These are very costly and cannot be affordable to all the hospital owner. During the handling, stresses developed in both i.e. patient & staffs are same for all the hospital. Our aim to minimize all such type of possibility which occurs during patient handling and for that required to provide a better solution for patient handling to these hospitals whose are having limitations for the use fully automated beds & stretcher. As per the above problem generated at the time of patient handling we provide modified mattresses for patient handling. Cost of these mattresses is affordable for all type of hospital and it is beneficial for patient handling.

### 5.4 Future Work

- 1) Design of trolley cum stretcher.
- 2) Development of trolley cum stretcher.
- 3) Design of modified mattresses.
- 4) Development of trolley cum stretcher.

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