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Automated Wheelchair Convertible Stretcher – A Review

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Abstract - *The problem of shifting the patients exists from prehistoric times. People who get seriously injured or ill were carried by others by means of wooden stretcher with cloth or leather tied to it. Later they were carried on wheels which reduced the effort of the person carrying the patients. Though we have evolved in the field of healthcare and technology we are not yet able to address this problem efficiently.*

Mobility aids are used for carrying the patients. Wheelchairs and stretchers are the most generally used mobility aids for the movement of patients. Transferring the patients from wheelchair to stretcher or to the medical bed or vice versa is always an issue for the attendant or nurse. There is a wide range of wheelchairs available today driven by needs and desire of man.

Hence we suggest a design of wheelchair convertible stretcher which is a boon to the medical field. It would be maintained and operated easily either by the patient or by the attendant according to the comfort of the patient.

***Key Words*: Wheelchair, Stretcher, Review, Wheelchair convertible stretcher, Mobility aid, Healthcare.**

1. INTRODUCTION

In easy words a wheelchair can is a structure having a set of wheels attached to a chair. Wheelchair is an equipment which can empower and enable a person with a disability to live a normal and independent life. For the past years wheelchairs have evolved rapidly from the manual wheelchairs to the powered wheelchairs. Still these wheelchairs have not satisfied the needs of the disabled people. It is therefore crucial that the problems of disabled be understood and accordingly wheelchairs are to be developed fulfilling their needs. So we have done a review based on multipurpose wheelchair that can work as wheelchair as well as a Stretcher. This paper is the result of a review of the design and development of a multi-functional Wheelchair that would perform all the required functions.

1.1 Objective

- To decrease the cost by selecting the type of mechanism.
- To work reliably under different operating conditions.
- To save space.
- To save the precluding exertion by the patient.

2. LITERATURE REVIEW

The author in [1] gives us various concepts regarding wheelchair convertible stretcher. Concept 1 enlightens us about a sliding tubular frame which is attached to the back rest of the wheelchair. A handle is provided in the back rest so that the user can pull it easily and can convert it into stretcher. Concept 3 gives us an insight to the hydraulic scissor lifter mechanism, so that the height can be adjusted according to the user's convenience. A hydraulic scissor lifter mechanism lifts the entire wheelchair into stretcher. Concept 5 is based on the gear mechanism. According to the rotation of the middle wheel, the front and back seats are rotated in opposite direction and stretcher arrangement is achieved.

The authors in [2] utilizes electric power to showcase the conversion of wheelchair into a temporary bed. A new type of electric wheelchair which can support bedridden patients. The wheelchair used in this study was an electric wheelchair made by Kawamura Cycle Co., Ltd. (model KE15). A joystick controls the velocity, and the motor rated output is 192 W (24 V).

The authors in [3] gives us an insight into how we can utilize a mechanism for the aforesaid conversion. The paper gives us an insight into the utilization of mechanism based concepts. Concept 1 in this concept the person can move to the bed using the leg support pad which is extended by a pneumatic cylinder. Concept 2 in this concept the person moves onto bed by a conveyor mechanism which pushes him forward. The chair has guides and can revolve about itself giving the user 360 degree accessibility. Concept 3 in this concept the wheelchair has a movable and extendable board. The person can transfer himself from this board to the bed. Concept 4 this wheelchair has the provision of moving the backrest and resting it onto the bed. The person can slide over the backrest to the bed in backward direction.

The authors in [4] have utilized pneumatic power for the conversion of wheelchair into stretcher or vice versa. The authors in [5] have used the concepts of electronics in their paper.

The authors in [7] gives an insight into the use of hydraulic based mechanism to get the aforementioned motion (conversion).

3. CONCLUSION

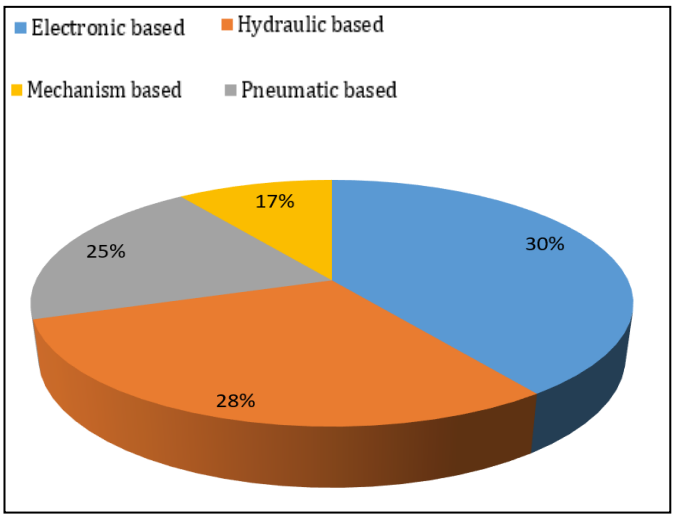

Fig -1: Our Findings.

Our study gives an insight to the different types of mechanisms used in the existing wheelchair convertible stretchers. We observed that around 30% of existing products available in the market are electronic based, 28% are hydraulic based, 25% are pneumatic based and the rest 17% are mechanism based. We also observed that, the electronic, hydraulic and pneumatic based wheelchair convertible stretchers available in the market are a lot expensive whereas the mechanism based wheelchair convertible stretcher is quite cheap.

3. RESULT

As there are only 17% wheelchair convertible stretchers available in market, we are focused on developing a mechanism based wheelchair convertible stretcher which would be easy to use, cost effective, having less maintenance and according to the comfort of patients. It would also help to reduce to some extent the precluding exertion by the patient.

REFERENCES

[1] Sreerag C S, Gopinath C, Manas Ranjan Mishra, "DESIGN AND DEVELOPMENT OF CONCEPTUAL WHEELCHAIR CUM STRETCHER", SASTECH Volume 10, Issue 2, Sep 2011.

[2] Toshihiro Yukawa, Yuhki Kuramochi, Taisuke Takahashi, Kohsuke Takahashi, "Nursing-Care System for Bedridden Patients with Electric Wheelchair, Lift, Portable Bath, Mobile Robot and Portable Toilet", International Journal of Engineering and Innovative Technology (IJEIT) Volume 2, Issue 5, November 2012.

[3] Sumedh J. Suryawanshi, Dr. K. Janardhan Reddy," Conceptual Product Development of Wheelchair for People Disabled in Legs", International Journal of Research in Mechanical Engineering Volume 1, Issue 2, October-December, 2013.

[4] Padmanabhan M, Rahoof T E, Vipin Raj V M, Vivek Krishnan K," PNEUMATIC STRETCHER-CHAIR DEVICE FOR PARALYSED PATIENTS", IJRET: International Journal of Research in Engineering and Technology Volume: 03 Issue: 03, Mar-2014.

[5] NOMULASRINIVAS, KAMMAKOMATI SPURTHY," Improve the Performance of Smart Wheelchair for Multipurpose Applications Based On ARM7", International Journal of Scientific Engineering and Technology Research Volume.04, IssueNo.22, July-2015.

[6] Rashid Ahmed K., Safar Abdul Razack, Shamil Salam, Vishnu Prasad K.V., Vishnu C. R.," Design and Fabrication of Pneumatically Powered Wheel Chair-Stretcher Device", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 4, Issue 10, October 2015.

[7] Rajeev V. R, Ramjith Krishnan R, Prof. K Gopalakrishna Pillai," Fabrication of Advanced Wheelchair cum Strecher", Internation Journal of Engineering Studies and Technical Approach, Volume 02, No. 2, February 2016.