

Design And Development in Patient Transfer Chair

Dr. M. Sohail Pervez¹, Dr. R.N. Dehankar², Maheshwari Jivan Wankhede³

Anjuman College of Engineering and Technology

Abstract—Moving a patient from their bed to some other places for daily routine is such hard work. Caregiver usually using a wheelchair to move a patient from place to place. Nevertheless, they are facing a problem in lifting the patient from bed to wheelchair. The caregiver needs to use lots of energy to lift the patient into a wheelchair, and it may take a long time. This study focuses on design and develops a transfer lifter assistor to assist the caregiver move the patient from bed to another place. It was flexible and easy to conduct. This innovation's advantages are that the height could be adjusted, making the patient more comfortable to sit on from a bed. The size could be adjusted up to 3 and a half feet. The structure mostly from steel and can be disassembled for storage purposes. The result shows that Transfer Lifter Assistor can perform effectively to lift patients with a maximum weight of 50 kilograms. It can support one patient at a time. This innovation has been successfully produced with cost-effective and can be owned by everyone.

Index Terms—transfer chair, patient shifter, care taker

I. INTRODUCTION

The wheelchair is an excellent mobility assistive device, although transferring from a wheelchair proves difficult to lifting patients because of the high burden to caregiver and risk of falls. As per observation found carrying heavy medical equipment and patients are the major causes of low back pain for nurses. Likewise, Moreover, nurses who position patients in beds and lifts them without getting help experience low back pain.

The manual transfer of disabled patients from the bed to an ordinary wheelchair is demanding and involves complex movements. Caregivers need to lift of the patient, repositioning or turning from the bed towards the direction of the wheelchair, and seating the patient safely in the chair. Therefore, improving the designs of wheelchairs is highly essential in order to resolve various difficulties transfer patient from bed to wheelchair. The goal of this project was to develop a user-friendly device which is designed to eliminate the

manual lifting of patients from bed to wheelchair. This simple transfer equipment will be beneficial to the health of caregivers.

AIM: -

To propose future research directions and design improvements aimed at enhancing the functionality, sustainability, and inclusivity of mechanical automation in wheelchair mobility.

II. OBJECTIVE

- Designing an efficient way of transferring a patient from bed to stretcher with minimal human efforts. Transfer of patient is done by smooth lifting of patient lying bed over the adjacent hospital/ home/ any other bed.
- Determination of standard dimension for Stainless Steel material which is to be used in the fabrication of patient transferring device. And also, to determine the various load acting on other parts of the device by virtue of patient weight and the weight of the material being used for fabrication in order to design the suitable hydraulic high-capacity load lift and vice-versa.

III. PROBLEMS IDENTIFICATION

Handling of patients from the stretcher right from

Operation Theatre to ward or even while transferring

from ambulance to emergency wards has been difficult

task when the patients have been severely injured.

Currently patients are being transferred in two ways.

1. Patient is rolled down when patients are conscious.
2. Patient is lifted Manually by the caretaker.

3. Patient is lifted using cloth on which patients are

Lying.

Caregivers and nurses often have to lift patients and seat them into wheelchairs, beds, or automobiles. It is estimated that one out of every two non-ambulatory patients fall and becomes injured when being transferred from a bed to a wheelchair. In addition, one in every three nurses becomes injured from the physical exertion of moving non-ambulatory patients. According to current statistics, the number of people in the United States, 65 years or older, will double in the next 25 years. In 1950, there were 8 adults available to support each elder 65 or older. Today, the ratio is 5:1 and by 2020 this ratio will drop to 3 working age adults per elderly person. Many surveys showed that there is a need for devices that provide mobility, lift, and can transfer patients so that subjects can reach upper shelves, or be placed on toilets, chairs, beds, and bathtubs. The literature survey showed that mobility devices today are not combined with patient transfer devices or rehabilitation devices. The combination of patient mobility with lift is minimally available today. Intelligent mobility is being researched where algorithms are applied to powered chairs to move a patient autonomously although without patient transfer. Individually, mobility devices, transfer devices, or rehabilitation devices are commercially available, some operated by caregivers and some by patients.

IV. LITERATURE REVIEW

1)International Journal of Scientific & Engineering Research Volume 11, Issue 6, June-2020 ISSN 2229-5518

Design and Fabrication of Patient Transferring Device
1SanjuKumar Pujari, 1Sathisha T, 4Sachin, 1Revan Swamy, 2N Nagasuresh Babu 1Student, 2 Assistant Professor School of Mechanical Engineering, REVA University, Bangalore, India.

ABSTRACT: Patient transferring device is a mobility aid which allows the person to transfer the patient from one location to the other. This project designed in such a way that could transfer the patient with critical injuries, stroke, paralysis, infectious diseases, disabled person and other health related problems from wheel chair to the hospital bed with the aid of only one nurse

especially while transferring a patient lying on the wheelchair cum stretcher to the adjacent hospital bed effortlessly and efficiently. The design of the project includes modelling, calculations for selection of standard cross-section material used for the chassis of the device, gear design, kinematic calculation on the connecting rods which takes part in the conversion of wheelchair to stretcher/straight bed and vice-versa. The main focus of this project is to design a patient transferring device where no physical contact between patient and the wheelchair operator is seen while transferring the patient to any bed from the wheelchair.

2)International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8, Issue-6S4, April 2019, Design, Experiment and Fabrication of Multipurpose Stretcher for Patients Arunkumar K N, Charan Kashyap K, Chirag B C, Kausthubh R, Keerthan J

ABSTRACT: —A multipurpose stretcher is an advanced stretcher where we can transfer patient from stretcher to bed with minimum human intervention. If we see go by conventional method accidents and comfortless to the patient is more. This paper describes the design and fabrication of a multipurpose Stretcher for patients. We are required to design and create a multipurpose Stretcher which uses gears and belts for lateral movement and hydraulic jacks for adjustment of the height of the beds. The stretcher will be controlled manually with a wheel for lead screw and an extension lever for hydraulic jacks using legs. Currently the stretcher is only designed for linear movement. However, plans to incorporate maneuverability and other functions can be implemented after the first stage of the development achieves success.

3)Automated Wheelchair Convertible Stretcher Smitesh Bobde¹,Ninad Borkar², Saurabh Apte², Shubham Ghuguskar² ¹Assistant Professor, Department of Mechanical Engineering, Dr. Babasaheb Ambedkar College of Engineering and Research, Nagpur, Maharashtra. India. ²Student, Department of Mechanical Engineering, Dr. Babasaheb Ambedkar College of Engineering and Research, Nagpur, Maharashtra. India.

ABSTRACT: The challenges faced during transferring the patients exist from ancient times. People who get seriously injured or ill were carried by

others by means of wooden stretcher with cloth or leather tied to it. Afterwards they were carried on wheels which reduced the effort of the people carrying the patients. Although we have evolved in the field of healthcare and technology, we are not yet able to address this problem efficiently. Adopting various kinds of research methods helped us to obtain more information about hospital mobility aids and for data collection. Mobility aids are used for transportation of patients. Wheelchairs and stretchers are the most commonly 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 revolution of wheelchairs available today driven by needs and desire of man.

4) International Journal of Innovative Research in Science, Engineering and Technology (A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com Vol. 9, Issue 2, February 2020

Copyright to IJIRSET

DOI:10.15680/IJIRSET.2020.0902098 14021

Performance and Analysis of Wheelchair cum Stretcher S. Joseph Allwin¹, V. Joswa Jinish Rajapandi¹, T.Jenny Jayasingh¹, P. Mukesh Pandian¹, S.Sheik Sulaiman², I.Neethi Manikam²
Final year students, Department of Mechanical Engineering, Francis Xavier Engineering College, Tirunelveli, TamilNadu, India¹ Professor, Department of Mechanical Engineering, Francis Xavier Engineering College Tirunelveli, TamilNadu, India²

ABSTRACT: The problem of Transferring the patients from prehistoric times. An adaptive technology known as wheelchair is used to deal with loss of mobility for the patients who are not able to walk normally due some injury or some other agerelated walking disabilities permanent or under treatment. mobility aids are used for carrying the patients. wheelchairs, stretchers and walkers are the most generally used mobility aids for the movement of patients. when it comes to caretakers. so, there is a need for a wheelchair cum stretcher to facilitate the disabled patients. Mobility and to provide novel medical equipment for use in the Indian hospitals.

V. REASON FOR SELECTING THE PROJECT

Around 75 million people uses wheelchair to perform basic tasks on day-to-day basis. The paper focuses on

different patient transfer assistive devices and the ill-effects of manual handling on patients and caregivers. Manual lifting and handling expose caretakers to a risk of musculoskeletal disorders due to poor working posture, which may result in accidents and injuries to patients/caregivers. While transferring patients manually, who are suffering from Cerebral Palsy, paralysis, polio and other such disorders leads to discomfort in back and upper extremities of caregivers. Patient transfer assistive devices helps caregivers to transfer patients and to reduce the efforts while transferring. The motive of this paper is to review existing patient transfer assistive devices. The purpose of this review is to study different mechanism used in transfer assistive devices and its analysis.

VI. WORKING PRINCIPLE

Introducing the Transfer Lift Wheelchair for Home - the ultimate solution for safe and effortless patient transfers. This electric patient lift transfer chair is designed to provide maximum comfort and convenience for both the caregiver and the patient. With its foldable and portable design, this transfer chair can easily be transported and stored, making it perfect for home use or on-the-go. Whether you need to transfer your loved one from bed to wheelchair or from wheelchair to car, this chair has got you covered. The adjustable height feature allows you to customize the lift to the perfect level, ensuring smooth and easy transfers.

The lift chairs for the elderly can be easily controlled using the included remote, eliminating the need for manual lifting and reducing the risk of injury. Safety is always a top priority, which is why this transfer lift wheelchair has a maximum load capacity of 290lbs. It is built with sturdy materials that ensure stability and durability throughout each transfer. The wheelchair transfer belt also provides additional support and security for the patient. Not only does this transfer chair provide a safe and efficient transfer experience, but it also promotes independent mobility.

The electric wheelchair transfer allows individuals with limited mobility to navigate their surroundings with ease. Experience the convenience and peace of mind that comes with the Transfer Lift Wheelchair for Home.

REFERENCES

- [1] H. Kopka and P. W. Daly, A Guide to LATEX, 3rd ed. Harlow, England: Addison-Wesley, 1999.
- [2] Woods, B., & Watson, N. (2003). A short history of powered wheelchairs. *Assistive technology*, 15(2), 164-180.
- [3] Silvia E. Rodrigo, Carina V. Herrera, Editor(s): Pablo Diez, *Smart Wheelchairs and Brain-Computer Interfaces*, Academic Press, 2008, Pages 257-290.
- [4] Wolfson, Penny Lynne. "Enwheeled: Two centuries of wheelchair design, from furniture to film." (2014).
- [5] Tremblay, Mary. "Going back to Civvy Street: A historical account of the impact of the Everest and Jennings wheelchair for Canadian World War II veterans with spinal cord injury." *Disability & Society* 11.2 (1996): 149-170. 9
- [6] Frank, A. O., De Souza, L. H., Frank, J. L., & Neophytou, C. (2012). The pain experiences of powered wheelchair users. *Disability and rehabilitation*, 34(9), 770-778.
- [7] R. A. Cooper, "Intelligent control of power wheelchairs," in *IEEE Engineering in Medicine and Biology Magazine*, vol. 14, no. 4, pp. 423-431, July-Aug. 1995, doi: 10.1109/51.395325.
- [8] Min, Rhee Kun, and Choi Hwa Soon. "Development of the foldable manual/power hybrid wheelchair." *Journal of the Korean Society for Precision Engineering* 23.2 (2006): 172-180.
- [9] S. Desai, S. S. Mantha and V. M. Phalle, "Advances in smart wheelchair technology," 2017 International Conference on Nascent Technologies in Engineering (ICNTE), Vashi, India, 2017, pp. 1-7.
- [10] Ferracuti, Francesco, et al. "Augmenting Robot Intelligence via EEG Signals to Avoid Trajectory Planning Mistakes of a Smart Wheelchair." *Journal of Ambient Intelligence and Humanized Computing*, vol. 14, no. 1, Jan. 2023, pp. 223-35. DOI.org (Crossref), <https://doi.org/10.1007/s12652-021-03286-7>.
- [11] Tomari, Mohd Razali Md, et al. "Development of Smart Wheelchair System for a User with Severe Motor Impairment." *Procedia Engineering*, vol. 41, 2012, pp. 538-46. DOI.org (Crossref),
- [12] Favey, C., et al. "Autonomous Navigation of a Visually Impaired Person with Loss of Limb Sensitivity, via a Smart Wheelchair (Case Study)." *Modelling, Measurement and Control C*, vol. 81, no. 1-4, Dec. 2020, pp. 30-34. DOI.org (Crossref),
- [13] Onyango, S. O., et al. "A Driving Behaviour Model of Electrical Wheelchair Users." *Computational Intelligence and Neuroscience*, vol. 2016, 2016, pp. 1-20. DOI.org (Crossref),
- [14] Batayneh, Wafa, and Yusra AbuRmaileh. "Decentralized Motion Control for Omnidirectional Wheelchair Tracking Error Elimination Using PDFuzzy-P and GA-PID Controllers." *Sensors*, vol. 20, no. 12, June 2020, p. 3525. DOI.org (Crossref),
- [15] Ryu, Hye-Yeon, et al. "Development of an Autonomous Driving Smart Wheelchair for the Physically Weak." *Applied Sciences*, vol. 12, no. 1, Dec. 2021, p. 377. DOI.org (Crossref),
- [16] Farah F. Alkhalid and Bashra Kadhim Olewi, "Smart Autonomous Wheelchair Controlled by Voice Commands-Aided by Tracking System." *Iraqi Journal of Computer, Communication, Control and System Engineering*, Feb. 2019, pp. 82-87. DOI.org (Crossref),
- [17] Xi, Lele, and Motoki Shino. "Shared Control of an Electric Wheelchair Considering Physical Functions and Driving Motivation." *International Journal of Environmental Research and Public Health*, vol. 17, no. 15, July 2020, p. 5502. DOI.org (Crossref),
- [18] Sadi, Muhammad Sheikh, et al. "Finger-Gesture Controlled Wheelchair with Enabling IoT." *Sensors*, vol. 22, no. 22, Nov. 2022, p. 8716. DOI.org (Crossref),
- [19] Atchaya et al. "SMART WHEELCHAIR AND HOME AUTOMATION." *International Research Journal of Engineering and Technology (IRJET)*, vol.07, no. 02, Feb. 2020, p. 1878-1883
- [20] Wastlund, Erik, et al. "Evaluating Gaze-Driven Power Wheelchair with " Navigation Support for Persons with Disabilities." *Journal of Rehabilitation Research and Development*, vol. 52, no. 7, 2015, pp. 815-26. DOI.or
- [21] Lim, Myungjoon, et al. "The Development and Usability Testing of the Smart Home for Wheelchair Users - Focus on the Activities of Daily Living at Home -." *Journal of the HCI Society of Korea*, vol. 11, no. 2, Aug. 2016, p. 5. DOI.org (Crossref),

- [22] Leaman, Jesse, and Hung Manh La. "A Comprehensive Review of Smart Wheelchairs: Past, Present, and Future." IEEE Transactions on Human-Machine Systems, vol. 47, no. 4, Aug. 2017, pp. 486–99. DOI.org (Crossref),
- [23] Ghorbel, Agnes, Nader Ben Amor, and Mohamed Jallouli. "A survey ` on different human-machine interactions used for controlling an electric wheelchair." Procedia Computer Science 159 (2019): 398-407.
- [24] Leaman, Jesse, Hung Manh La, and Luan Nguyen. "Development of a smart wheelchair for people with disabilities." 2016 IEEE International Conference on Multisensory Fusion and Integration for Intelligent Systems (MFI). IEEE, 2016.
- [25] Sheridan, Thomas B. "Human–robot interaction: status and challenges." Human factors 58.4 (2016): 525-532.
- [26] S. Mahmud et al., "A Multi-Modal Human Machine Interface for Controlling a Smart Wheelchair," 2019 IEEE 7th Conference on Systems, Process and Control (ICSPC), Melaka, Malaysia, 2019, pp. 10-13, doi: 10.1109/ICSPC47137.2019.9068027