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A REVIEW ON DESIGNS OF WHEEL CHAIR-CUM -STRETCHER

[1]Raveesh Rai, [2]Hari Krishnan, [3]Reevan D' Almedia, [4]Anvitha S, [5]Santhosh S*

[1]Student, [2] Student, [3]Student, [4]Student, [5]Assistant professor*

Mechatronics Engineering,

Mangalore Institute of Technology and Engineering, Moodbidri, India

Abstract: Wheelchair and stretchers are commonly used in hospitals. And this medical equipment is used for transferring patients from one place to another. During transferring patients, it creates problems to patients and also creates problems for attendant and nurse. Sometimes it creates problems to patient while transferring patient from wheelchair to stretcher, stretcher to bed and bed to wheelchair is always issue for both hospital staff and family members of patient. This system causes stress, body pain to patients and sometimes chances to sleep down the patient. Understanding the various issues regarding the mobility equipment a better design will be an asset for medical field and helpful for disabled person. This paper presents the various design and fabrication of wheelchair cum stretcher and aims to explore design for patient to transfer patient from bed to wheelchair and wheelchair to stretcher. This innovation helps medical staff to transfer patient from chair to bed very easily because chair become a stretcher and it is adjustable to height of bed. Conversion of wheelchair to stretcher and vice versa is achieved by simple linkage mechanism which can be manually or automatically operated mechanism.

I. INTRODUCTION

This technical review delves into the fascinating field of wheelchair-cum-stretcher systems, examining the complex engineering feats, design concerns, and future directions in mobility assistance technology. Wheelchair-cum-stretcher systems combine comfort, functionality, and adaptability to meet the many demands of people who are limited in their mobility. The goal of this analysis is to analyse several parts of current designs, such as material choices, user interfaces, propulsion systems, and conversion mechanisms. We hope to identify gaps, obstacles, and opportunities in the development of these game-changing technologies by carefully examining the literature landscape. This will open the door to future developments and improved accessibility in healthcare settings and beyond.

Fig 1: Wheel chair-cum-strecher

II. METHODOLOGY

Yash Shah et al. [1] To create the WCS, a thorough investigation and analysis of current wheelchair and stretcher mechanics was carried out. The goal was to design a conversion mechanism that would allow a wheelchair to be easily converted into a stretcher without sacrificing comfort or stability. For this reason, the final design includes locking mechanisms, movable joints, and adjustable footrests and backrests. With its straightforward levers and locking mechanisms, the WCS makes conversion simple and lowers discomfort and injury risk during patient transfers. With characteristics that can be adjusted to meet different patient needs, it offers a sturdy surface for both sitting and lying down. Nevertheless, the conversion process increases the design's weight and complexity, which could raise production costs and storage space needs. Lightweight materials and electric motors could be used to solve these problems and enhance usefulness.

Rhutik K. Patil et al. [2] suggested a dynamic wheelchair design with cutting-edge features for improved performance. For robustness and portability, the lightweight aluminum alloy frame is used. The propulsion mechanism improves maneuverability by transforming hand gestures into effective rotary motion through the use of a special linkage system. User comfort is improved via movable armrests and adjustable seats. However, the intricate design can make production and maintenance more expensive, and extensive testing is necessary to ensure long-term endurance. Subsequent advancements may concentrate on utilizing smart features like autonomous navigation and obstacle recognition, as well as exploring alternate propulsion systems.

Foez Ahmed et al. [3] presented a smart wheelchair system that combines software and hardware elements to improve mobility. For the purposes of tracking orientation and detecting obstacles, sensors collect ambient data. The wheels are propelled by motors, which allow for a variety of Bluetooth or Wi-Fi-controlled maneuvers. Although the technology increases user independence and safety, maintenance may call for specialist knowledge. AI algorithms and more sophisticated sensors may be used in future improvements to improve user interface and navigation.

Kiran et al. [4] created a wheelchair/stretcher utilizing CAD and a variety of materials, offering a reasonably priced solution. Its bulkier and heavier construction than that of conventional wheelchairs, however, has drawbacks. Future advancements will entail creating a design that is lighter and more compact and has extra functions like motorization.

Mohit Kumar et al. [5] used experimental and theoretical techniques to create a wheelchair/strainer that has benefits in emergency scenarios. Although its tiny and lightweight design makes it more manoeuvrable, it may need specialized manufacture and maintenance, which could raise expenses.

Manojkumar Ambalagi et al. [6] suggested a wheelchair-turned-bed that is automated and has a sanitizing mechanism in order to facilitate patient transfers and reduce the risk of infection. Its size and intricacy,

meanwhile, might make it more difficult to maneuver. Future advancements can concentrate on controls that are easy to use and small.

Rutvik Deshpande et al. [7] created a versatile wheelchair with a focus on comfort, portability, and functionality. The multipurpose design increases weight and complexity, which could raise production costs and maintenance needs. Future advancements might look into lighter materials and personalized designs.

Shao Hng Lim et al. [8] suggested a wheelchair stretcher that folds up for easier transportation. Its intricacy and production costs, however, could be problematic. Research in the future might concentrate on creating lighter materials.

Dr. Ramachandra C et al.[9] Constructed a multipurpose stretcher/wheelchair using the use of computer-aided design and physical labor. Despite being lightweight and affordable, its mass may limit its maneuverability. Other elements that increase patient comfort and movement may be added in the future.

S. Joseph Allwin et al. [10] developed a lightweight and portable wheelchair cum stretcher using readily available materials. However, its strength may be inadequate for certain patients. Future work could focus on improving durability and strength.

Akshay Hirudkar et al. [11] suggested a system that could seamlessly switch between stretcher and wheelchair modes using both mechanical and electrical components. Although it improves patient comfort and transfer, its cost and complexity could be disadvantages. Wireless communication and intelligent control systems may be the main areas of future development.

Mohammed Iqbal Khatib et al. [12] rolled out an automatic wheelchair system to increase independence and mobility. Its expense and upkeep needs, however, could be difficult. Future advancements might focus on battery technology and sophisticated control systems.

Shivam, Rishabh Tripathi et al. [13] provided a thorough process for creating a wheelchair system that works. Although it enhances comfort and mobility, its expense and complexity could be disadvantages. Subsequent investigations may examine substitute propulsion methods and customized user interfaces to improve usability.

III. CONCLUSION

The reviewed literature study illustrates the development of wheelchair/transfer systems, emphasizing improvements in functionality, design, and user experience. Approaches that cover ideation, creation, manufacturing, and innovation in the industry. Notable discoveries encompass smooth conversion processes, innovative propulsion systems, intelligent features, and automation. But issues like complexity, expense, weight, and upkeep still exist and must be carefully taken into account in new improvements. Wheelchair cum stretcher systems have the ability to completely transform patient care in hospital settings by solving these issues and expanding on the knowledge gained from previous studies. Continuous research and development will keep these vital mobility aids more innovative and increase their comfort, efficiency, and accessibility.

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