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Revolutionizing Emergency Preparedness And Rapid Response: The Value Of Foldable Community Patient Couches In Disaster And Crisis Situations

Shapna Sankar[1], Shanmugananth Elayaperumal[*2]

[1]Research scholar, School of Physiotherapy, Sri Balaji Vidyapeeth (deemed to be university), Puducherry.

[*2]Professor & Principal, School of Physiotherapy, Sri Balaji Vidyapeeth (deemed to be university), Puducherry.

***Corresponding Author:**

Shanmugananth Elayaperumal

Professor and Principal of Physiotherapy, School of Physiotherapy, Sri Balaji Vidyapeeth (deemed to be university), Puducherry.

Email ID: shankutty1981@gmail.com

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ABSTRACT

The field of invention meant to the present disclosure generally relates to the technical field of assistive devices for physician and patients and in specific relates to a portable folding bed for easy and efficient camping treatment which eliminates the physician's and patient's inconvenience while treating in community sector. A concern for physician faced during the community camping service in helping the public to attain the complete health treatment. Mostly the community camping have to depend on the hospital bed and equipment which proceeds to the transferring process of bed from hospital to camp setup and also from one camping place to other camping place. Additionally, the physician and patient have to completely depends on the bed which is over weight to transfer, which results to the lack in number of bed for the treatment of patient. In order to avoid this status, there's a need of device that enable the effective way of transporting or transferring the bed easily by folding it and carried by an individual. According to an aspects, this invention provides a portable folding bed with wheel for mobility and also compressed of elevating adjustable back rest to make user convince, further it help in easy and comfortable position for patients and their treatment. In order to create the modular bed, a main feature is required for the patient care depending on the severity of illness, most of the camping sector doesn't handle the case of intensive care, but incase if there is need or possibility to attend these case in camping , the patient need to be isolated from other patient within the camping place. To solve this problem, this modular bed contains the attached screen facilities for the patient privacy and for the isolated treatment care. In some situation, the slide screen are also unnecessary in hospital sector, so to fulfill the requirements of screen in camping this modular bed may achieve the growing demand.

ARTICLES HIGHLIGHTS:

- These couches are **lightweight, durable, and easy to transport**, making them ideal for use in emergency **disaster relief camps, mobile hospitals, community health centers, and field clinics**
- their role in global health emergency responses, such as during outbreaks of infectious diseases like COVID-19, Ebola, and cholera.
- A portable folding bed for easy and efficient camping treatment way of transporting or transferring the bed easily by folding it and carried by an individual and a bed with wheel for mobility and also compressed of elevating adjustable back rest to make user convince and attachment of screen facilities for the isolated treatment care.

Keywords: *Assistive Devices; Modular bed; Emergency, Disaster and community sector**;** Foldable And Portable Couch.*

1. INTRODUCTION

In India, the landscape of healthcare is as diverse as the nation itself, with rural areas often facing significant challenges in accessing quality medical services .[(1)] However, amidst these challenges, a wave of innovation and invention is emerging, aimed at revolutionizing rural healthcare delivery and facilitating in taking healthcare delivery to the doorsteps. The intersection of technology, entrepreneurship, and community engagement is driving a new era of rural healthcare innovation

in India. From remote villages to small towns, healthcare innovators are leveraging advancements in telemedicine, mobile health applications, and low-cost medical devices to bridge the gap between urban and rural healthcare services. [2] These initiatives are not only enhancing access to healthcare but also empowering local communities to take charge of their health and well-being.

Moreover, grassroots innovations tailored to the specific needs and constraints of rural India are gaining momentum. Whether it is innovative healthcare delivery models, novel diagnostic tools suited for resource-limited settings, or community driven health programs, these initiatives are catalysing positive changes at the grassroots level. [3]

In the wake of increasing natural disasters, pandemics, and humanitarian crises, emergency preparedness and rapid response have become more critical than ever. A recent report of the United Nations [4] shows that the world population is ageing, and the growth of the ageing population is the fastest in Asia, Latin America, and the Caribbean. The number of people over 65 is likely to increase from 702.9 million in 2019 to 1548.9 million in 2050. Many of these ageing people would be bedridden due to age-related mobility issues. In addition to age-related problems, many people are bedridden due to various diseases, accidents, surgeries, and other health issues. The bedridden patients need full-time care and attention. Family, friends, nurses, and other professionals provide this care and attention. [5]

Efficient medical interventions in these situations require adaptable and portable solutions that can be quickly deployed to accommodate a surge in patients. One such innovation that has transformed emergency medical care is the foldable patient couch. Designed for portability, durability, and ease of use, these couches provide a practical solution for medical teams operating in challenging environments, including disaster zones, field hospitals, and mobile health units.

Disasters—whether caused by earthquakes, hurricanes, floods, or pandemics—often overwhelm healthcare systems, leading to a shortage of medical beds and treatment spaces. In such scenarios, foldable patient couches serve as a versatile alternative to traditional hospital beds, enabling healthcare providers to create temporary care facilities efficiently. Their compact and lightweight design allows for easy transportation, while their quick setup ensures that patients receive timely medical attention. This is particularly essential during the golden hour—the critical period immediately following a disaster, where rapid medical intervention can significantly reduce morbidity and mortality rates.

Furthermore, foldable patient couches enhance triage operations by providing designated spaces for patient assessment and stabilization. They facilitate pre-hospital care, first aid stations, and emergency shelters, ensuring that both minor and critically injured patients receive the necessary medical attention before being transferred to more advanced care facilities. Additionally, their ergonomic design and durable construction offer comfort and support, minimizing the risk of further injury in fragile patients.

Moreover, foldable patient couches contribute to effective triage and patient management in crisis situations. By providing a comfortable and stable surface for patients to rest, these couches help healthcare workers assess injuries, stabilize critical cases, and administer emergency procedures more efficiently. In mass casualty incidents, where time and resources are limited, having an adaptable and mobile medical solution significantly improves patient outcomes.

Another key advantage of foldable patient couches is their role in global health emergency responses, such as during outbreaks of infectious diseases like COVID-19, Ebola, and cholera. During the COVID-19 pandemic highlighted the need for **temporary healthcare setups** to accommodate the surge in patients.

Community health centers and emergency care units worldwide faced a shortage of hospital beds, healthcare systems faced severe capacity constraints, requiring innovative solutions for patient isolation, quarantine, and treatment and this leading to the use of alternative patient care solutions. Foldable patient couches provided an **affordable, scalable, and accessible** option for expanding healthcare capacity without the need for permanent infrastructure investments.

A foldable patient couch is a specially designed medical furnishing that provides a **portable, space-saving, and efficient** solution for treating patients in emergency settings. These couches are **lightweight, durable, and easy to transport**, making them ideal for use in **disaster relief camps, mobile hospitals, community health centers, and field clinics**. Their ergonomic design ensures patient comfort while allowing healthcare providers to conduct examinations and administer treatment efficiently.

Foldable patient couches allowed for the rapid expansion of treatment areas in makeshift hospitals , community camping and overflow centers, helping mitigate the burden on traditional healthcare facilities. Beyond their immediate medical benefits, these couches also support logistical efficiency in disaster relief operations. Given that emergency response teams often work under resource-constrained conditions, foldable patient couches reduce logistical challenges by being easy to transport, stack, and store. Their cost-effectiveness and reusability make them a sustainable investment for governments, NGOs, and humanitarian organizations involved in disaster response and preparedness.

In conclusion, the integration of foldable patient couches into emergency response frameworks represents a significant advancement in disaster preparedness. As the frequency and scale of crises continue to rise globally, adopting innovative medical solutions like foldable patient couches will be essential in ensuring efficient, effective, and life-saving healthcare

delivery in disaster-affected areas.

2. METHOD

In this paper, the basic data for designing the foldable bed are obtained from some literature review, websites, video lectures, and video tutorials. There are four important aspects that need to be considered in the process design.[11,12,13] Besides from the research method, this paper also provides the proposed design by using 3D software drawing in the synthesis stages.[10]

This aims to make it easier for the reader to understand the mechanism design that being proposed. To achieve the several objectives of this adjustable medical bed that can be folded and they occupy the minimum space for storage. Furthermore, the obtained data from this methodology chapter will be used for description and safety factor analysis in both efficiency and quality analysis. [10]

Need for Rural Health Care Innovation and Invention

The need for rural healthcare innovation and invention in India is paramount, given the vast disparities in healthcare access and outcomes between urban and rural areas. Rural populations often face barriers such as inadequate infrastructure, limited healthcare facilities, and shortages of trained medical personnel, exacerbating health inequalities. Additionally, factors like geographical remoteness, socio-economic challenges, and cultural barriers further impede access to healthcare services. [6]

In this context, innovative solutions tailored to the unique needs and constraints of rural India are essential to improve healthcare access, enhance diagnostic and treatment capabilities, and empower communities to take proactive measures towards better health outcomes. This intervention was shared in a few of the success stories in article--Facilitation of Rural Health Care at the Doorsteps by Focusing on India-centric IPR Innovations:

A Tribute to Atmanirbhar Bharat Abhiyan, Senthil Murugappan, Shapna Sankar, Partha Nandi and Nilakantan Ananthakrishnan ISSN-0566-2257 UNIVERSIRY NEWS A Weekly Journal Of Higher Education Association Of Indian Universities Vol.62; No.51; December 16-22, 2024

The stories can drive India towards achieving universal healthcare coverage and ensuring that no one is left behind in the journey towards a healthier nation as envisaged in the Sustainable Development Goals of the United Nations.

Foldable Community Patient Couch he present invention relates to a portable and foldable patient couch with improved features for providing effective treatment including physiotherapy in isolated environments during camping. Patent has been applied for Indian Patent with the application no 202341055545 dated 15.09.23.[7]

The couch comprises of a rectangular and foldable base frame structure having a head part and a foot part coupled through hinges and four legs with wheels fixed at bottom of 4 vertexes of the base frame along with a head side rail, a foot and side rails. It also has an elevatable backrest and a stable core body panel coupled through hinges in which the backrest can be elevated by lifting it and locking it in the elevated position using a backrest actuator disposed on the base frame.[7] (Fig. 6&7).

This Foldable Community Patient Couch has been selected as one of the best rural innovations in Puducherry in the third Innovation Contest organized by the Confederation of Indian Industry (CII), Puducherry in the year 2024. The Foldable community couch can be used for providing door step care for physiotherapy and bedside nursing services.[7]

3. FIELD OF THE INVENTION

The present invention generally relates to the field of patient support apparatuses such as hospital beds. More particularly, the present invention relates to a portable and foldable patient couch with improved features for providing effective treatment in isolated environment during camping.

4. REVIEW OF LITERATURE - FOR THE INVENTION

Hospital bed and other patient supports are known. Typically, such patient supports are used to provide a support surface for patients or other individuals for treatment, recuperation, or rest. Many such patient supports include a frame, a deck supported by the frame, a mattress, side rails configured to block egress of a patient from the mattress, and a controller configured to control one or more features of the bed. There are reports available in the state of art relating to hospital bed.

- US7480951B2 discloses a bed comprising: a frame; a deck coupled to the frame to support a body; a communication network; at least one module coupled to the communication network, including a charting module having an interface configured to be coupled to an input device comprising a bar code scanner for inputting information identifying a doctor's treatment prescription relating to at least one of rotational therapy and percussion therapy to the charting module, the charting module storing the information and transmitting the information to the communication network, and a display, coupled to the charting module, to display the information.
- US8006332B2 discloses a patient support apparatus may include a base frame, lift arms, an intermediate frame, a deck support having three articulating sections, a brake system, various drive motors, actuators, and sensors, at least

one power source, communication devices, and at least one controller, wherein the lift arms, articulating sections, drive motors, brake system, and actuators may be controlled from the atleast one controller and in response to signals received by the various sensors, while storing data internally and/or sending data to a remote location.

- US9539156B2 discloses a patient support apparatus includes a deck, a plurality of siderails, a control panel, and a plurality of subsystems, such as a bed exit system that detects when a patient may exit from the support apparatus, or a lifting mechanism to raise and lower the deck. A controller is in communication with the control panel and is adapted to monitor conditions regarding the side rails and/or the other subsystems. Atleast one lamp is also provided on the patient support apparatus that is adapted to be illuminated in a first manner when a plurality of monitored conditions remain in a desired state, and in a second manner when at least one of the plurality of monitored conditions changes to an undesired state.
- US7845032B2 discloses hospital bed including a mattress and a frame. The width of the frame of the hospital bed is adjustable and the width of the mattress is adjustable. The hospital bed may include a frame and mattress adapted to support a heavy or large patient, including a bariatric or obese patient. Medical camps are preplanned activities were volunteer medical teams congregate at a specified place and perform a wide range of mostly elective procedures for a limited and specified period of time normally a week or little more, usually at no cost to the patient. Most of the camping sector doesn't handle the case of intensive care, but incase if there is need or possibility to attend these case in camping , the patient need to be isolated from other patient within the camping place.

The beds disclosed in the above prior arts have the advantages of better rigidity and strong support, but it is heavy and inconvenient for transfer from hospital to any other places. In particular, it will be difficult to carry them easily to the camping sites. Besides, it needs at least two persons to move the mattress placed on the bed frame. It is a waste of manpower and time-consuming. Moreover, the existing bed doesn't provide any privacy/isolated environment for effective treatment.

Therefore, there is a need for a couch which has features for patient privacy and for isolated treatment care thereby achieving effective treatment during camping. The present invention overcomes all the above said drawbacks and provides a portable and foldable patient couch that can be easily transported and as well providing effective treatment in isolated environment during camping.

5. OBJECT OF THE INVENTION

The main object of the present invention is to provide a portable and foldable patient couch with wheels which is convenient for folding and moving. Another object of the present invention is to fabricate a portable and foldable patient couch for providing effective treatment in isolated environment during camping.

Yet another object of the present invention is to fabricate a portable and foldable patient couch comprises of a rectangular and foldable base frame structure with wheels fixed at bottom of 4 vertexes of the base frame along with head side rail and foot siderail, a rectangular and foldable patient platform, a rectangular mattress, four telescopic cylindrical rod with hooks and an insulator board. Further object of the present invention is to utilize the fabricated portable and foldable patient couch for providing effective treatment during Community camps, Medical camps, emergency situations and the like.

6. ABSTRACT OF FIGURE

The present invention discloses a portable and foldable patient couch[1] for providing effective treatment in isolated environment during camping. The couch[1] of the present invention 10 comprises of a rectangular and foldable base frame structure[2] having head part[3] and foot part[4] coupled through hinges[11] and four legs[5] with wheels[20] fixed at bottom of 4 vertexes of the base frame[2] along with head side rail[6] and foot side rail[7], characterized in that

a. a rectangular and foldable patient platform[8] comprises of an elevatable backrest[9] and 15 a stable core body panel[10] coupled through hinges[11];

b. a rectangular mattress[14] comprises of foldable upper part and lower part;

c. four telescopic rods[15] disposed above the head side rail[6]and foot side rails[7] on 4 vertexes of the base frame[2] and comprises of a cylindrical rod[21] with hooks[16] at top; 20

d. an insulator board[19] removably fixed on the telescopic rod[15] by nuts and bolts.

TABLE 1 : Shows The Diagram Parts Name For Intervention

SL.NO.	PART NAME	PART NO :
1.	Portable and foldable patient couch	1

2.	Rectangular and foldable base	2
3.	Head part	3
4.	Foot part	4
5.	Legs	5
6.	Head side rail	6
7.	Foot side rail	7
8.	Rectangular and foldable patient platform	8
9.	Backrest	9
10.	Core body panel	10
11.	Hinges	11
12.	Degree elevator	12
13.	Backrest actuator	13
14.	Mattress	14
15.	Telescopic rod	15
16.	Hook	16
17.	IV hanger	17
18.	Screens	18
19.	Insulator board	19
20.	Wheels	20
21.	Cylindrical rod	21

BRIEF DESCRIPTION OF THE DRAWINGS:

Figure 1 depicts patient couch of the present invention with screens.

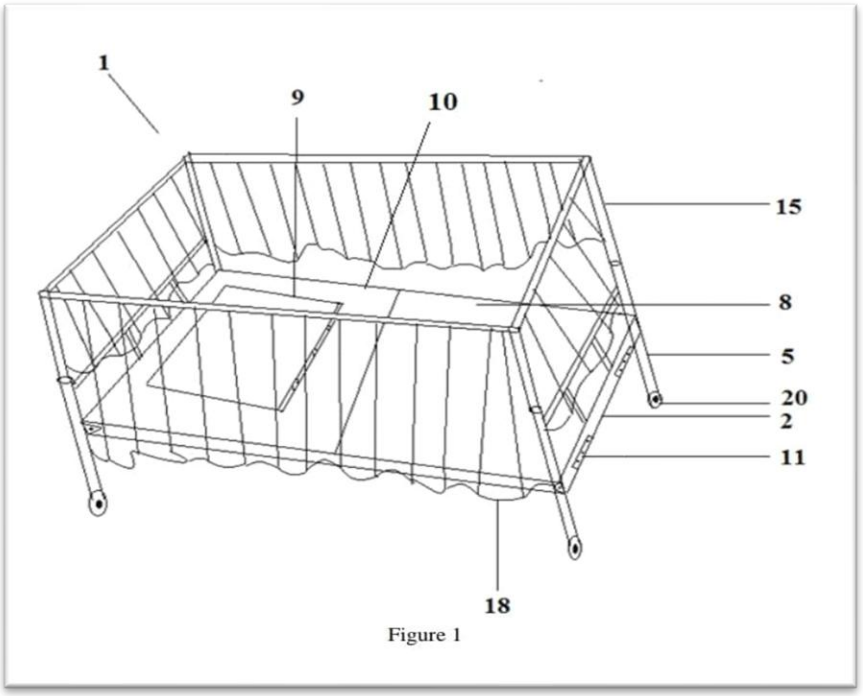


Figure 1

Figure 2 depicts foldable view of patient couch of the present invention.

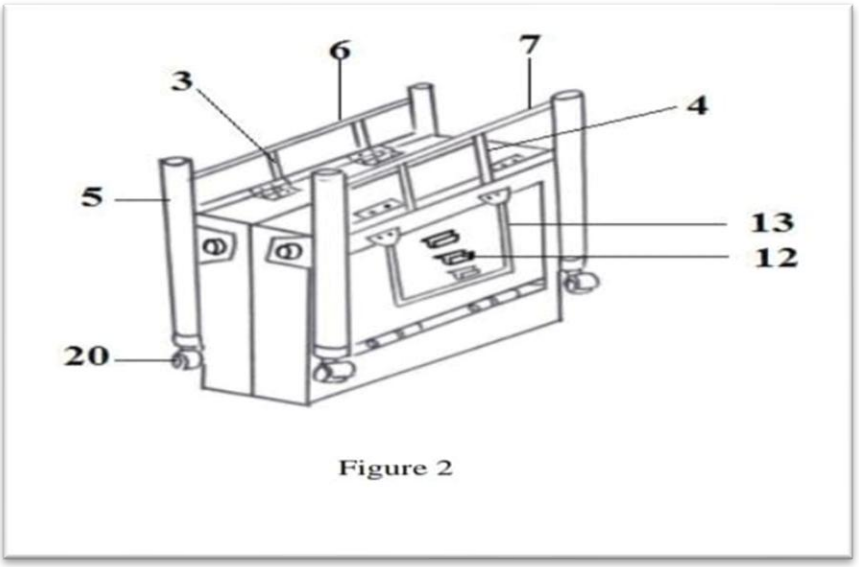


Figure 2

Figure 3 depicts portable and foldable patient couch of the present invention with insulator board and cylindrical rod with hook.

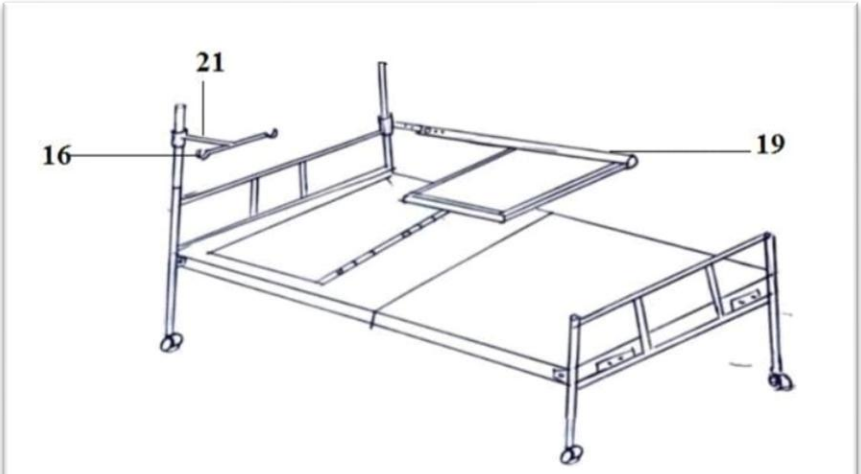


Figure 3

Figure 4 depicts IV hanger mounted in the telescopic rod.

Figure 5 depicts elevated back rest of the patient platform.

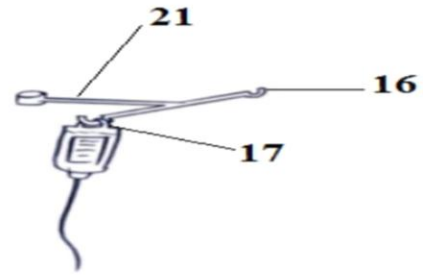


Figure 4

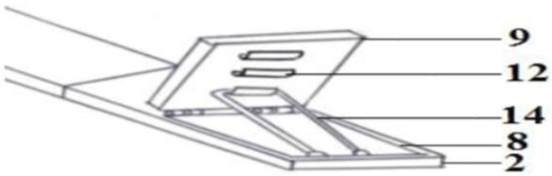


Figure 5

NOVELTY:

- Made of weight less material .
- For patients comfortable position the back rest is elevated. Back rest elevation in angle basis by using protector. (Degree=30,60,90)
- To provide privacy bed have the screen attached

- Less requirement of space because of foldability of bed.
- Easily portable by an individual because of less weight.
- Easily transportable with the help of wheels
- Attachment of Flexible trip stand
- Attachment of insulator tray for modalities

DETAILED DESCRIPTION OF THE INVENTION:

The present invention discloses a portable and foldable patient couch[1] for providing effective treatment in isolated environment during camping. The couch[1] of the present invention comprises of a rectangular and foldable base frame structure[2] having head part[3] and foot part[4] coupled through hinges[11] and four legs[5] with wheels[20] fixed at bottom of 4 vertexes of the base frame[2] along with head side rail[6] and foot side rail[7].

Characterization In The Couch Of The Present Invention:

- ✓ A rectangular and foldable patient platform[8] adapted to securely position on the base frame[2] and comprises of an elevatable backrest[9] and a stable core body panel[10] coupled through hinges[11]. The backrest[9] is disposed with plurality of degree elevator[12] at back and elevated by lifting the backrest[9] and locking the elevated position by mounting a backrest actuator[13] disposed on the base frame[2] on the degree elevator[12].
- ✓ A rectangular mattress[14] adapted to securely position on the patient platform[8] and comprises of foldable upper part and lower part. The upper part is configured to elevate along with the backrest[9] of the patient platform[8].
- ✓ Four telescopic rods[15] disposed above the head side rail[6] and foot side rails[7] on4vertexes of the base frame[2] and comprises of a cylindrical rod[21] with hooks[16] at top and configured to elongate and compress. An IV hanger[17] is mounted on the hook[16] for holding IV fluids or alternately screens[18] are mounted on all the sides for providing isolated environment or both.
- ✓ An insulator board[19] removably fixed on the telescopic rod[15] by nuts and bolts.

ADVANTAGES OF THE PRESENT INVENTION:

- The bed/couch of the present invention can be foldable and there foreless storage space is required.
- Lightweight and easy to transport. They can be quickly set up or packed away during any camps.
- The elevating adjustable back rest makes user convince, further it help in easy and comfortable position for patients and their treatment.
- The screen facilities provides patient privacy and isolated treatment care.
- The bed/couch of the present invention is also useful in situations where temporary accommodation is required such as medical camping, emergency shelters, disaster relief operations, or military deployments.

Figure 6 3D EXPLANATION of depicts patient couch of the present invention with telescopic pipe for screen

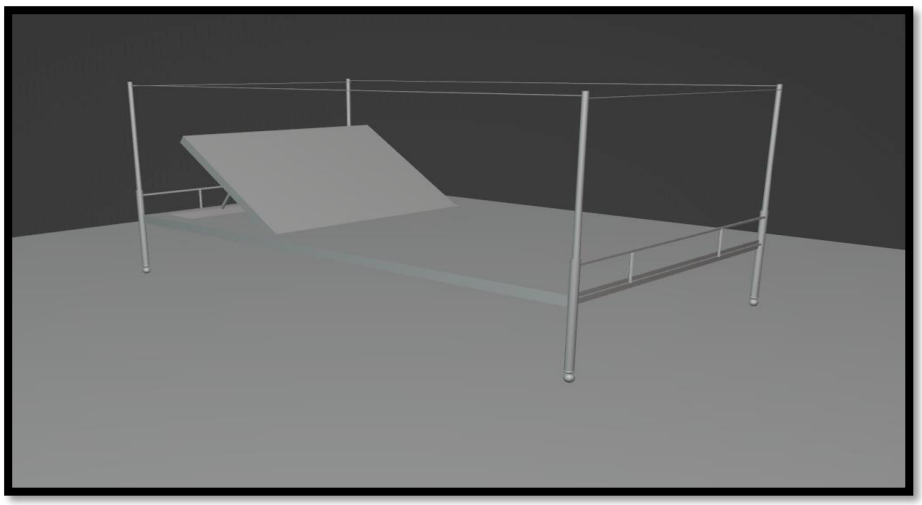
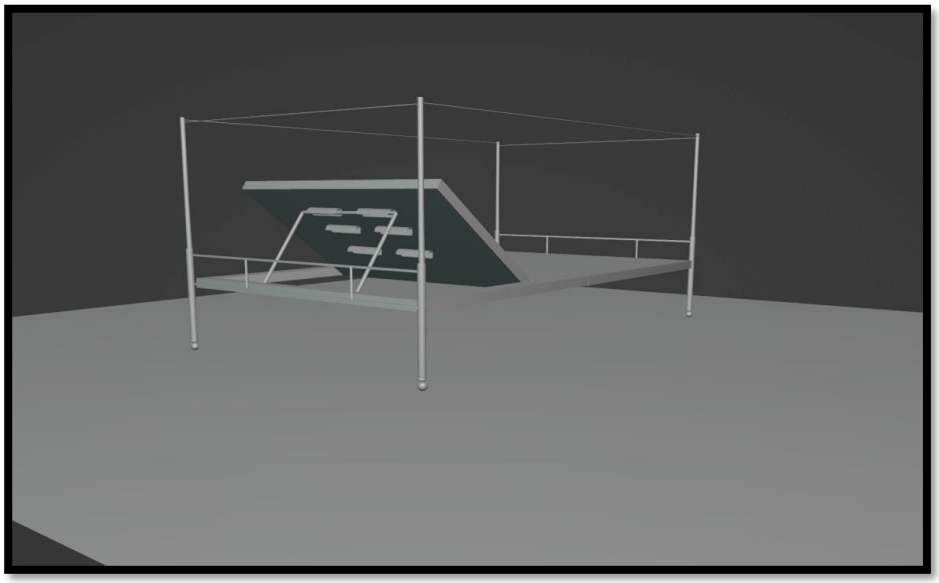


Figure 7 3D EXPLANATION - depicts elevated back rest of the patient platform



7. SUMMARY OF THE INVENTION

A concern for physician faced during the community camping service in helping the public to attain the complete health treatment. Mostly the community camping has to depend on the hospital bed and equipment which proceeds to the transferring process of bed from hospital to camp setup and also from one camping place to other camping place. Therefore, it can be concluded that the portable and foldable patient couch of the present invention found to eliminates the physician's and patient's inconvenience while treating in community sector.

In one of the preferred embodiments, the present invention shall disclose a portable and foldable patient couch[1] for providing effective treatment in isolated environment during camping. The couch[1] of the present invention comprises of a rectangular and foldable base frame structure[2] having head part[3] and foot part[4] coupled through hinges[11] and four legs[5] with wheels[20] fixed at bottom of 4 vertexes of the base frame[2] along with head side rail[6] and foot side rail[7], characterized in that

a. A rectangular and foldable patient platform[8] adapted to securely position on the base frame[2] and comprises of an elevatable backrest[9] and a stable core body panel[10] coupled through hinges[11] in which the backrest[9] is disposed with plurality of degree elevator[12] at back and elevated by lifting the backrest[9] and locking the elevated position by mounting a backrest actuator[13] disposed on the base frame[2] on the degree elevator[12];

b. A rectangular mattress[14] adapted to securely position on the patient platform[8] and comprises of foldable upper part and lower part in which the upper part is configured to elevate along with the backrest[9] of the patient platform[8];

c. Four telescopic rods[15] disposed above the head side rail[6] and foot siderails[7] on 4 vertexes of the base frame[2] and comprises of a cylindrical rod[21] with hooks[16] at top and configured to elongate and compress, in which an IV hanger[17] is mounted on the hook[16] for holding IV fluids or alternately screens[18] are mounted on all the sides for providing isolated environment or both;

d. An insulator board[19] removably fixed on the said telescopic rod[15] by nuts and bolts.

8. DISCUSSION

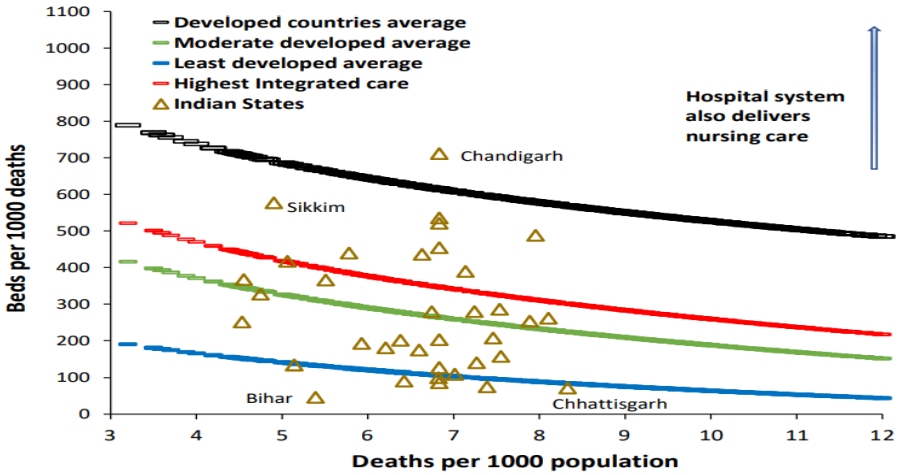
Alternatively, available features integrated into hospital beds designed to reduce physical stresses on caregivers when repositioning patients have received relatively little study.

Hospital bed features designed to reduce physical stresses on caregivers may have advantages over designs that are not integrated into the bed. For example, repositioning aids may need to be installed and retrieved under patients; and then laundered, stored, charged, or disinfected after use. Alternatively, features integrated into the bed may eliminate extra steps required by the caregiver that can create a barrier for use.[8]

The sheer power of the nearness-to-deaths effect is amply demonstrated by Covid-19. For example, in England during 2021 a COVID-19 hospital admission has an average length of stay around 9.6 days (including any time in critical care), there are 3 admissions for every death and 29.4 bed days per total COVID-19 deaths (deaths occurring in all locations).[14]

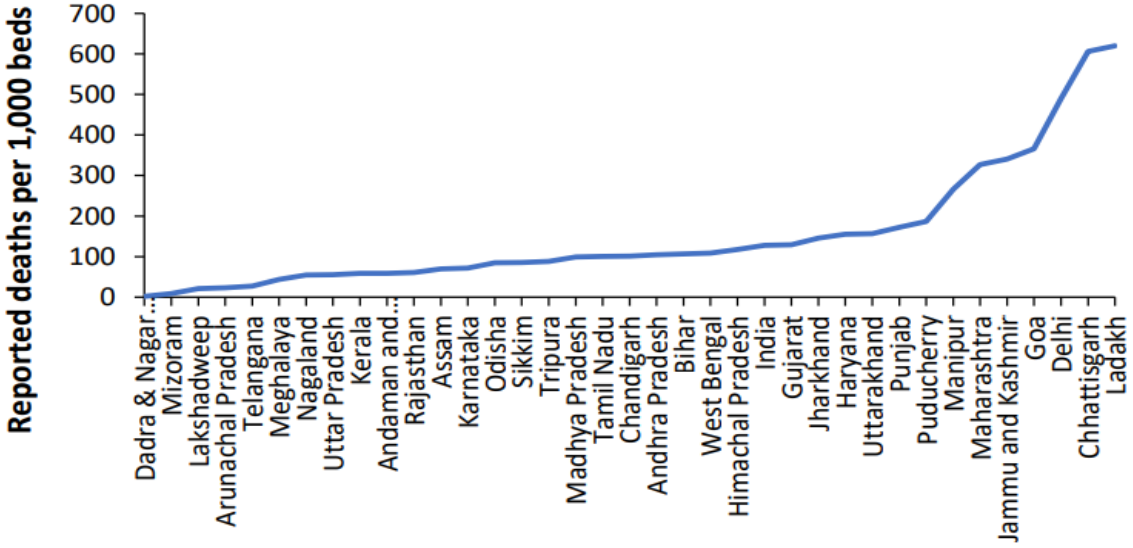
For comparison, countries like Japan lie well above the international average because it counts nursing homes as hospital beds. Countries such as Australia lie at the international average, beds in England lie slightly above the line for the most highly integrated health systems (Singapore and New Zealand), however, England has nowhere near the level of integrated care to justify this low level of bed provision.13 England therefore has fewer hospital beds than 9 Indian states.[16]

Figure 8 Beds in Indian states compared to international benchmarks. Population and deaths from HealthData.org. [15]



Reported COVID-19 deaths per bed in Indian states Clearly the pressure on beds will depend on the level of real COVID-19 deaths in each state and Figure 4 attempts to give an estimate based on "reported" deaths. While data in all states is likely to be an under estimate those on the right hand side will be experiencing the highest pressures. Spread of COVID-19 will vary greatly depending on the weighted state population density (including proportion living in slums), while reported deaths will depend on each state's testing strategy and the effectiveness of the COVID death reporting process.[16]

Figure 9 Reported COVID-19 deaths (9th May 2021) per 1,000 hospital beds (before COVID). Reported deaths from My Gov.In [17]



Hospital bed shortfall in India

Even when accounting for private healthcare and the overall number of hospital beds per 1,000 people, India falls well short of international norms. A research by Knight Frank and Berkadia states that there are currently 1.3 hospital beds for every 1,000 inhabitants Indians.

India lacks over 2.4 million hospital beds, according to the report, which illustrates the extent of underfunding in the healthcare industry. According to the research, "India needs 2.4 million more hospital beds, which presents a significant investment opportunity in healthcare infrastructure."[20]Growing per capita income, rising rates of cardiovascular and other lifestyle diseases, a steadily aging population, increased health consciousness, and broader health insurance coverage are the main factors driving the rising demand for healthcare. [20]

Furthermore, India is establishing itself as one of the most economically viable locations for medical tourism, even in spite of the lack of adequate medical facilities. With a ratio of 1.3 beds per 1,000, India's hospital bed shortage is further highlighted by the fact that Organisation for Economic Co-operation and Development (OECD) nations typically have 3–8 beds per 1,000 people. [20]

Based on India's classification as a low-middle-income nation (LMIC), where the need for healthcare is exacerbated by the country's dense population, susceptibility to infectious diseases, and frequent public health emergencies, the difficulties are especially severe. These deficiencies were revealed and made worse by the COVID-19 pandemic, but it also brought about certain improvements, like the tripling of hospital beds with oxygen and intensive care unit facilities. [20]

In 2021, India's 43 crore people needed hospital beds urgently, underscoring the country's severe healthcare infrastructure need. Since the strain on the healthcare system would have been less severe during non-Covid times, there would have been less of a demand for hospital beds—roughly 24 crore people—Dr. Kiran Madhala, secretary general of the Telangana Teaching Government Doctors Association, told South First. [20]

To elaborate that the great majority of the population currently doesn't have enough access to inpatient care because the 13 lakh hospital beds that are right away available can only accommodate about 4.8 crore people annually. This noticeable discrepancy highlights the requirement for 7 beds per 1,000 people annually in India in order to adequately address its healthcare needs. However, there is a significant infrastructure gap, as only 20% of the needed population is served by the current bedcapacity.

Dr. Madhala stated that increasing hospital bed capacity is essential to resolving this disparity and creating a robust healthcare system that can manage both regular needs and unplanned public health catastrophic events. [20]

Reports of Hospital and Hospital Beds In India

"India is facing a deficit of 2 billion sq ft of healthcare space to cater to its current population base of 1.42 billion people," Knight Frank India said in a statement. India has a considerable gap between the number of hospital beds available in the country and the number of hospital beds required.[21]

The number of hospitals in India has jumped from 43,500 in 2019 to 54,000 in 2024, according to a report by Pharmarack. The number of aggregate hospital beds has surged from 1.1 million to 1.3 million during the same period. This is expected to increase to about 1.7 million by 2030.[19]

The number of private hospitals has surged from 30,000 in 2019 to 38,000 in 2024 at a rate of 27%. The number of medical colleges has increased from 387 in 2014 with a total of 51,348 seats to 706 colleges in 2024 with 109,145 seats. In the same period, the number of nursing colleges has increased from 5,700 to 8,692, the report said.[19]The growth has been even more phenomenal in the online scene. According to the report, the online pharmacy market has grown nearly four-fold from $512 million in 2018 to $2 billion in 2024. The market, which was cruising at a 10-15% growth rate annually in 2018, climbed to 60% during the pandemic years, before stabilizing at 20% in the present year.[19]

Healthcare beds in government institutions

Among the states, Kerala leads the way with 1.19 beds per 1,000 population, reflecting its emphasis on public healthcare and community health initiatives. Combined with a high literacy rate, Kerala has achieved better healthcare outcomes and infrastructure. [20]

- Tamil Nadu ranks second with 1.07 beds per 1,000 population, benefiting from a robust network of medical colleges and district hospitals.
- Similarly, Rajasthan, with 0.82 beds per 1,000 population, has made commendable progress in recent years.
- Among the union territories, Lakshadweep stands out with 3.62 beds per 1,000 population, surpassing global averages. [20]
- Puducherry follows closely with 3.6 beds per 1,000 population, benefiting from similar advantages, including a strong healthcare infrastructure supported by medical colleges and specialised services.
- Chandigarh also performs well, with 3.14 beds per 1,000 population, thanks to its status as a well-planned city with a high concentration of healthcare resources. [20]

While some states in India have managed to achieve relatively higher hospital bed densities, many others continue to lag

behind due to a combination of factors such as underinvestment, rapid population growth & inefficiencies in healthcare management. [20]

- Bihar, for instance, has the lowest hospital bed density in the country, with just 0.22 beds per 1,000 population.

The state faces systemic challenges, including chronic underfunding, a shortage of healthcare professionals, and inadequate access to basic healthcare services, particularly in rural areas.

- Uttar Pradesh, the most populous state in India with over 230 million residents, fares slightly better but still has only 0.33 beds per 1,000 population. The state's healthcare system is severely overstretched, with the majority of its limited hospital beds concentrated in urban centers, leaving rural populations underserved.
- Madhya Pradesh, with a bed density of 0.5 beds per 1,000 population, faces similar issues. The state has vast rural areas where access to healthcare facilities is limited, and its public healthcare system remains underdeveloped compared to states like Tamil Nadu and Kerala.[20]

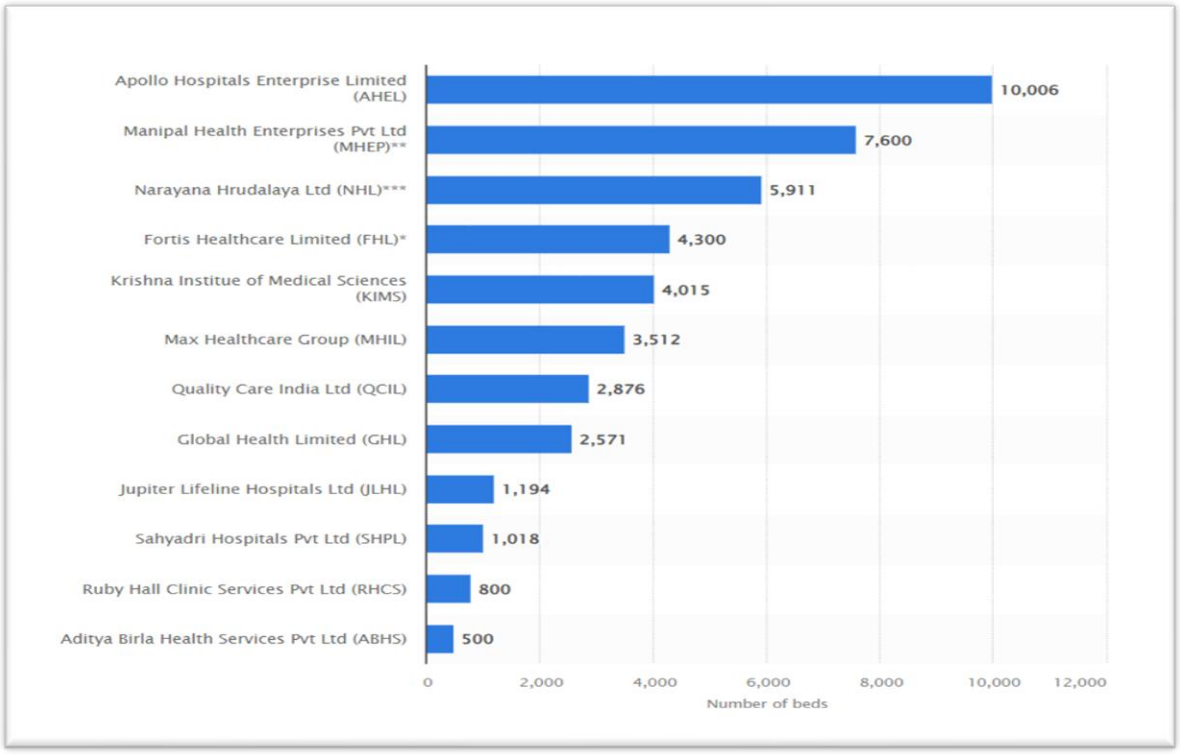
India's healthcare infrastructure is under immense pressure, with a bed-to-population ratio of just 1.4 beds per 1,000 people, significantly below the World Health Organization's recommended 3 beds per 1,000 people

Government Initiatives: The Indian government has expanded its healthcare program to provide citizens aged 70 & above with annual medical insurance coverage of ₹500,000 per family, aiming to alleviate the financial burden of healthcare expenses. [18]

TOTAL BED CAPACITY IN HOSPITALS IN INDIA AS OF FEBRUARY 2023

As of February 2023, Apollo Hospitals Enterprise Limited (AHEL) in India had the highest bed capacity of over 10 thousand beds, among major players in the health industry. Furthermore, AHEL is headquartered in Tamil Nadu. It has 71 hospitals across the nation, out of which 20 hospitals are located in Tamil Nadu.[22]

Figure 10 Current Scenario Of Leadimg Hospital Chain



Current Scenario Of Leading Hospital Chain [18]

- Apollo Hospitals Total beds: 10,103 Number of hospitals: 73
- Manipal Hospitals (MHEPL) Total beds: 9,500 Number of hospitals: 33
- Narayana Health Total beds: 6,042 Number of hospitals:21

- Aster DM Healthcare, India Total beds: 4,994 Number of hospitals: 19
- Fortis Healthcare Total beds: 4,500 Number of hospitals:28
- CARE Hospitals, Quality CARE India Limited Total beds: 4,000 No of hospitals:17

Addressing India's hospital bed shortage requires a multi-faceted approach, including increased investment in healthcare infrastructure, both from private investor & government initiatives. Collaborative efforts are essential to enhance accessibility and quality of healthcare service across the nation. [18]

Shortage of hospital beds in government hospitals;

One essential metric for evaluating a nation's healthcare system is the condition of its public healthcare infrastructure. Hospital beds, which are used for acute care, emergency management, and providing access to specialized treatment, are a crucial part of this provisioning. The ability of the healthcare system to respond to public health emergencies is largely dependent on the availability of sufficient hospital beds, which also has a direct impact on health outcomes. Information about hospital bed availability in India can be instructive. Additionally, there is a serious hospital bed shortage in India's public healthcare system. Significant regional discrepancies, especially in states with larger populations or fewer resources, make this shortfall worse [20]

The nation currently boasts only 0.79 government hospital beds per 1,000 people, which is significantly less than the 2.7 beds per 1,000 people global average and the two beds per 1,000 people suggested by the National Health Policy 2017[20]. India actually yet to meet the baseline recommendation of one bed per 1,000 people set forth in the Indian Public Health Standards (IPHS) 2022. As of March 31, 2021, India had 8,18,661 hospital beds spread throughout primary health centers (PHCs), community health centers (CHCs), sub-district hospitals, district hospitals, and medical colleges, according to a recent report presented to Parliament by Union Minister of Health and Family Welfare Jagat Prakash Nadd. [20]

In the world of disaster relief and crisis management, the ability to provide immediate, efficient, and high-quality healthcare is paramount. Whether it is during natural disasters, community camping, or medical emergencies, the need for adaptable and mobile healthcare solutions has never been greater.

One innovation that is revolutionizing emergency preparedness and response is the foldable community patient couch—a product designed to meet the diverse needs of both immediate care and long-term comfort in various healthcare settings.

Manufacturability of FCPC :

The construction of the bed is one of the most arduous aspects of this project. This is primarily because the size of the pieces involved makes it difficult to accurately and conveniently machine the parts needed to build the frame. Were this bed to go into mass production, it would be easier to fabricate and assemble due to advantages like frame jigs and assembly lines. Our estimated fabrication time for this bed is roughly 50 man-hours, but on a large scale, this number could be cut down as low as 10-15 man-hours.

Health and Safety Of FCPC :

Safety of the patient and caregiver is our main concern in production of the project. All materials used in construction are non-toxic and will not compromise the safety as they age. Different safety components including padding and plywood walls are implemented into the product to ensure that both the patient and caregiver are safe from all moving or potentially dangerous parts when operating the product.

The article stresses the importance of having flexible medical solutions in disaster and crisis situations. Traditional hospital beds are often impractical in temporary settings such as emergency shelters or makeshift hospitals, where space and resources are limited. Foldable patient couches, however, can be easily transported and set up in various locations, thus facilitating immediate medical intervention. These couches provide a stable, safe surface for patient care, which is crucial in high-pressure environments where the volume of patients is overwhelming.

Moreover, the study finds that foldable couches are more cost-effective than traditional medical beds, which makes them ideal for regions with constrained healthcare budgets. Their ability to be packed and stored efficiently ensures that a larger number of patients can be treated in areas with limited space, increasing the overall capacity for medical response.

The article also explores how foldable community patient couches can contribute to rapid deployment strategies. In disaster situations, the ability to quickly mobilize medical resources can make a significant difference in survival rates. The design and functionality of foldable couches allow for a swift and scalable response, particularly in the early stages of a disaster when timely medical attention is critical.

9. CONCLUSION

The integration of **foldable community patient couches** into emergency response and disaster preparedness strategies represents a significant advancement in **medical logistics and crisis management**. Their versatility, portability, and ease of use make them an **essential tool for healthcare professionals**, enabling them to provide efficient and effective care in the most challenging environments. As disaster response efforts continue to evolve, investing in adaptable and innovative medical solutions such as foldable patient couches will be crucial in **building resilient healthcare systems** that can withstand future crises.

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