Advancements in Patient Care and Safety: Integrating Nursing Innovations for Enhanced Healthcare Outcomes

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Abstract:

In the realm of virtual environments, hand haptic technology plays a crucial role in capturing the nuanced movements of a user's hands and fingers. This is complemented by a haptic sleeve that bridges the gap between the arm and hand, effectively translating these movements into corresponding actions performed by a robot avatar within the virtual space. Furthermore, these innovative devices are adept at relaying the force and texture felt by the robot avatar as it interacts with objects in the virtual environment back to the user. This interaction crafts an immersive experience, mirroring the sensation of physically touching and manipulating the objects. The prediction of wearer's joint torques uses the Hill-type model and is made through the flexion movement of the elbow joint.

As the user engages in object manipulation through the robot avatar, the haptic feedback disseminates throughout the entire arm, enriching the user experience with a wide spectrum of tactile sensations. This advancement in haptic technology significantly enhances the realism of robot operation, thereby improving the dynamics of human-robot interaction.

Keywords: hand haptic; haptic sleeve; hill type model; human-robot interface (hri); intent signal

Introduction

In A New Health System for the 21st Century, the Patient safety and patient care is a fundamental activity and responsibility of an organized work or activities of health care professionals that create cultures, processes, procedures and environments in health care that consistently and sustainably lower risks, reduces the occurrences of avoidable harm, make error less likely and reduce its impact when it does occur. Presently, patient centered care involves the sharing of information with patients, family and health care team with patients needs (including physical, psychosocial, and occupational and management of waste equipments during care, procedure and transport of patient.) Beliefs and expectations.

The Culture of Quality and Safety

In 1999, The Institute of Medicine released a sobering report titled To Err is Human: Building a Safer Health System, which stated that an estimated 98,000 hospitalized patients die each year from medical mistakes. The report was not intended to blame providers or hospitals but, rather, to clarify those bad systems of care (and not bad people) were largely responsible for these deadly mistakes. Furthermore, the report hoped to rally health care providers, administrators, regulators, and patients around a national imperative toward creating a culture of safety and developing systems of care to improve health care quality. In a subsequent report, A New Health System for the 21st Century, the health care system has many great successes, but there

continue to be opportunities for improving quality, access, and cost. The fee-for-service health care paradigm is shifting toward value-based care and will require accountability around quality assurance and cost reduction. As a result, many health care entities are rallying health care providers, administrators, regulators, and patients around a national imperative to create a culture of safety and develop systems of care to improve health care quality. However, the culture of patient safety and quality of care requires rigorous assessment of outcomes, and while numerous data collection and decision support tools are available to assist in quality assessment and performance improvement, the public reporting of this data can be confusing to patients and physicians alike and result in unintended negative consequences. This article explores the aims of health care reform, the new ideas of AI (artificial intelligence) efforts to create a culture of quality and safety, the principles of innovative in care and   quality improvement, and how these ideas can be applied to patient care and medical practice.

DEFINITION

Patient care: it's a type of model in which fully involvement of expertise in health care to identify, satisfy the full range of patients and family's needs, and preferences.

Or

A model of prevention, treatment and management of illness and preservation of physical and mental well-being through the services offered by the health care team.

Patient safety: a type of process or structure whose application reduces the probability of adverse event, unsafe acts within the health care system, through the best practices lead to optimal patient outcomes.

METHOD OF PRESENTATION

➢ The basic procedures, use of equipment and techniques, our new ideas for future implementation plans and strategies, and use of AI technologies in the care and safety of patients.

SIX AIMS FOR HEALTH CARE REFORM:

First, health care must be safe. "Primum non nocere" (first do no harm) should no longer be the sole burden of individual providers. Instead, hospitals must be held accountable for maintaining systems of care that ensure patient safety.

Second, health care should be effective. Health care providers must use evidence-based medicine and evidence-based practice. Since the best science and clinical practices in medicine continue to evolve, every practitioner should be expected to participate in life-long learning through continuing medical education to remain up to date. Reliance on tradition and anecdotal personal experience should no longer be acceptable practice. The phenomenon of "illusory superiority"—otherwise known as the "Dunning-Kruger effect" (a type of cognitive bias, where people with little expertise or ability assume they have superior expertise or ability. This overestimation occurs as a result of the fact that they don't have enough knowledge to know they don't have enough knowledge.) Highlights that poor performer often lack the skills and knowledge to identify their own poor performance.

Third, care should be patient centered. "For the secret of the care of the patient is in the caring for the patient." High-quality care needs to be respectful of the patient's values and receptive to the patient's input. All care decisions and therapeutic plans—including the rationale, risks, costs, and benefits—should be proactively explained to the patient. The "best possible outcome" is optimally decided through shared decision making by a highly competent care team and a well-informed patient.

Fourth and fifth, care should be timely and efficient. Unnecessary delays and prolonged waiting times can be frustrating and dangerous for patients depending on their underlying medical conditions. In addition to caring for their patients' welfare, all care providers should be good stewards of valuable health care resources. After an attentive patient evaluation, any blood tests, diagnostic imaging, and invasive procedures should be tailored to confirm or refute the provider's differential diagnosis specific for that individual patient. Whenever possible, decisions and plans should avoid wasting valuable equipment and precious time.

Lastly and arguably most importantly, care must be equitable. The quality of care should not vary based on a patient's personal characteristics, gender, race, religion, geography, or socioeconomic status. Every person across the country should have access to high-quality value-based care.

1) patient identification

➢ Positive patient identification prevents patient identification errors when hospital wristbands and labels and other PPID tools are used correctly.

➢ The National Quality Forum also lists wrong-patient mistakes as serious reportable events and also considers patient identification as a high-priority area for measuring health information (IT) safety.

➢ 86% of nurses and physicians surveyed have witnessed or know of a medical error resulting from a patient identification error

➢ 35% of all denied healthcare claims are due to inaccurate patient identification or incomplete patient information

➢ To **promote positive patient identification, or PPID for short**. We've assembled a list of 12 tips to help you protect your patients and your healthcare organization from patient identification errors.

PPID Tip #1: Use two forms of identification: Always use at least two separate methods of identifying a patient, such as the patient's name and date of birth. Do not use patient room number as an identifier.

PPID Tip #2: Involve the patient: Ask patients to identify themselves before receiving medication or treatment and encourage patients to participate in all stages of the process. If possible, ask patients or family members to verify identifying information to ensure its accuracy.

PPID Tip #3: Listen for questions: If a patient or family asks a question or expresses confusion about something related to patient identification, stop and listen. This may be the warning you need to prevent an error.

PPID Tip #4: Ask, don't confirm: Use specific language to ask a patient to identify themselves. Do not ask them to confirm their name. Instead say, "Please tell me your name."

PPID Tip #5: Standardize your methods: If you are part of a multi-facility healthcare organization, take steps to standardize your approach to patient identification among all of the facilities within the system. For example, standardize how names are displayed in electronic health records. Then, audit your policies and processes regularly to discover any potential system-wide risks.

PPID Tip #6: Have a plan for no name, same name: Provide clear protocols to staff members for identifying patients who lack identification, and for distinguishing the identity of patients with the same name.

PPID Tip #7: Snap a photo: Update your protocols to include patient photos, such as on patient wristbands. The use of patient photos is still in the minority among hospitals but it's a powerful defense against patient identification errors.

PPID Tip #8: Don't leave without labeling: Always label blood and other specimens in the presence of the patient. It's too easy to forget which label goes with which specimen.

PPID Tip #9: Pay attention to your little voice: Establish clear protocols for questioning test results or findings when they are not consistent with the patient's clinical history. If something doesn't look right, it probably isn't.

PPID Tip #10: Get it right from the start: Create clearly defined policies and procedures for the registration process to prevent patient registration errors from affecting care later in the visit. Devote adequate staffing resources to the registration team so they don't feel rushed, which is often a source of errors.

PPID Tip #11: Embrace digital technology: Implement automated healthcare technology systems –

❖ **EHRs,**
❖ **Computerized provider order entry,**
❖ **Bar coding,**
❖ **RFID (radio frequency identification)**

- ❖ **Digital informed consent tools,**
- ❖ **Physiologic monitors,**
- ❖ **E-prescribing, etc.**
- ❖ **Aadhar card type ID (all hospital data in one)**
- ❖ wherever possible. Doing so is proven to decrease the potential

for patient identification errors.

PPID Tip #12: Discuss and learn: Foster a culture where patient identification errors can be called out and discussed without fear of retribution. Every error offers an opportunity for learning and improvement.

     ○   2）Moral And Spiritual Support

Everyone has their own way of coping with pain and finding hope in times of distress. When walking through a health crisis, many turn to spirituality for comfort, and many people find their spiritual center in religion. The World Religion Database counts 18 major religious categories around the world. Scholars estimate that about 2,400 religions exist in total. Many peoples' identities are informed by their race, culture, ethnicity, gender, or religion. When it comes to receiving medical care, many patients will make decisions based on their identity in some or all of these categories.

Religion provides resources for coping with stress that may increase the frequency of positive emotions and reduce the likelihood that stress will result in emotional disorders such as depression, anxiety disorder, suicide, and substance abuse. The major problems such as Birth control, abortion, Autopsy and organ donation, Euthanasia and Death associated problems can be resolved.
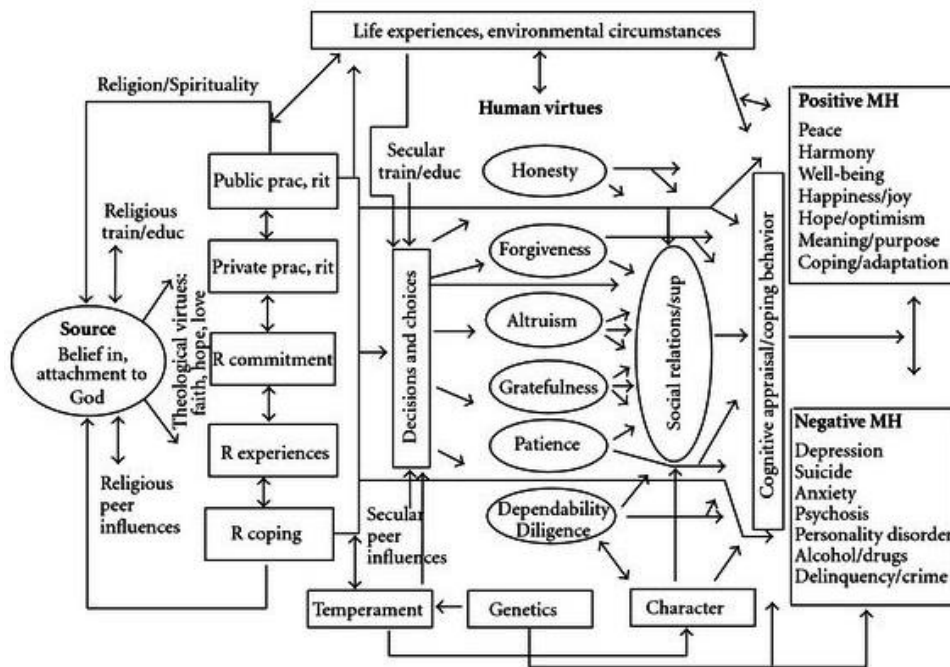

Figure 1: from ncib.nlm.nih.com

3) Patient Centered Care

Patient-centered care focuses on the patient and the individual's particular health care needs. The goal of patient-centered health care is to empower patients to become active participants in their care.

Person-centered care affording people dignity, compassion and respect. Offering coordinated care, support or treatment. Offering personalized care, support or treatment. Supporting people to recognize and develop their own strengths and abilities to enable them to live an independent and fulfilling life.
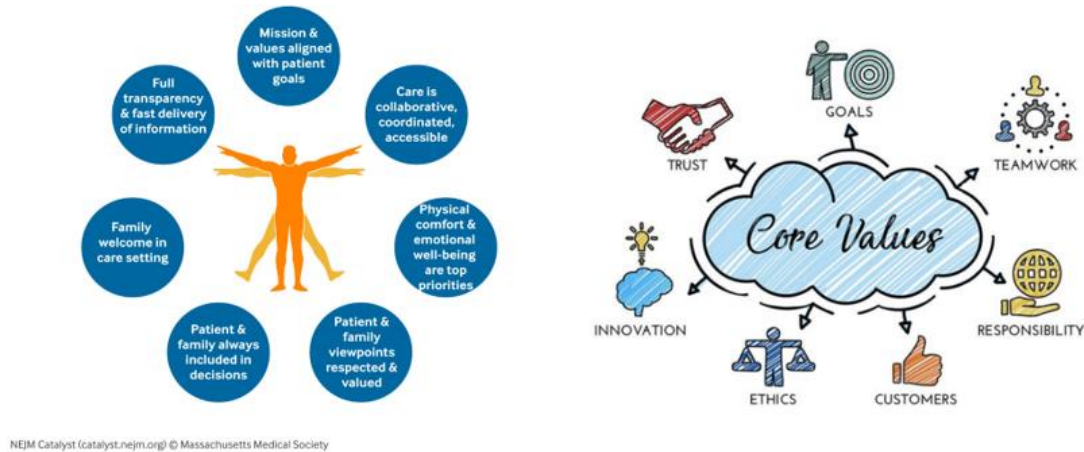
Figure 2: https://images.app.goo.gl/7TdrDucat5wKtjJGA

Benefits of Patient-Centered Care

- ❖ Improved satisfaction scores among patients and their families.

- ❖ Enhanced reputation of providers among health care consumers.

- ❖ Better morale and productivity among clinicians and ancillary staff.

- ❖ Improved resource allocation.

- ❖ Reduced expenses and increased financial margins throughout the continuum of care.

Care Of Patient in Transport

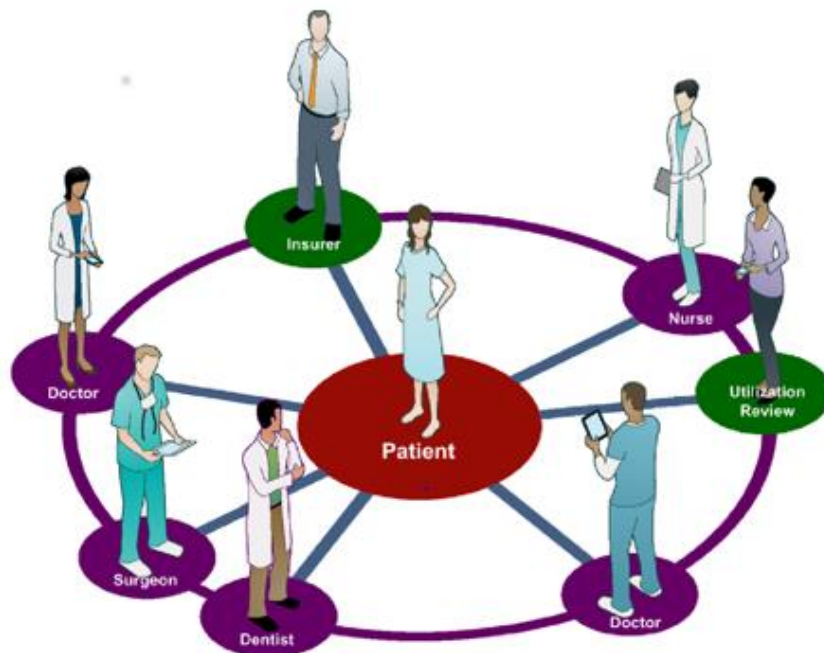1) AI assisted drone

2) Smart stretchers

3) Modified ambulance

Figure 3

Ai Assisted Drone

Artificial Intelligence-based devices assist researchers to broaden the levels of identification, detection, and delivery services. Generative AI in healthcare is a rapidly evolving field, encompassing the use of AI to generate realistic data, such as synthetic medical images, to train algorithms and accelerate research. This innovative technology not only creates synthetic data but also plays a pivotal role in transforming diagnostics. In fact, it brings about a level of precision that was once

unimaginable. Moreover, healthcare professionals, armed with the capability to analyze vast datasets, are now empowered to achieve early detection and more accurate diagnosis of medical conditions. Drones provide efficient diagnostics, detections, and supervision in aerial cases through high-performance built-in computers, thermal scanners, high-resolution cameras, and other tools.

We can use the AI drones in highly risk of accident regions, floods and other natural disasters, high altitude regions, in forest area to rescue of

highly vulnerable children's, old women and old age peoples and pregnant women. Also, in the more populated areas where high risk of accidents are occurs, there we have to activates it and control the area. Which involves travelling in that area every 2 hours, if anything happens related to health which have basic information such as identification of type and basic needs of patients and nearby health services centers and emergency CPR and resuscitation services by using surrounded peoples of incident.
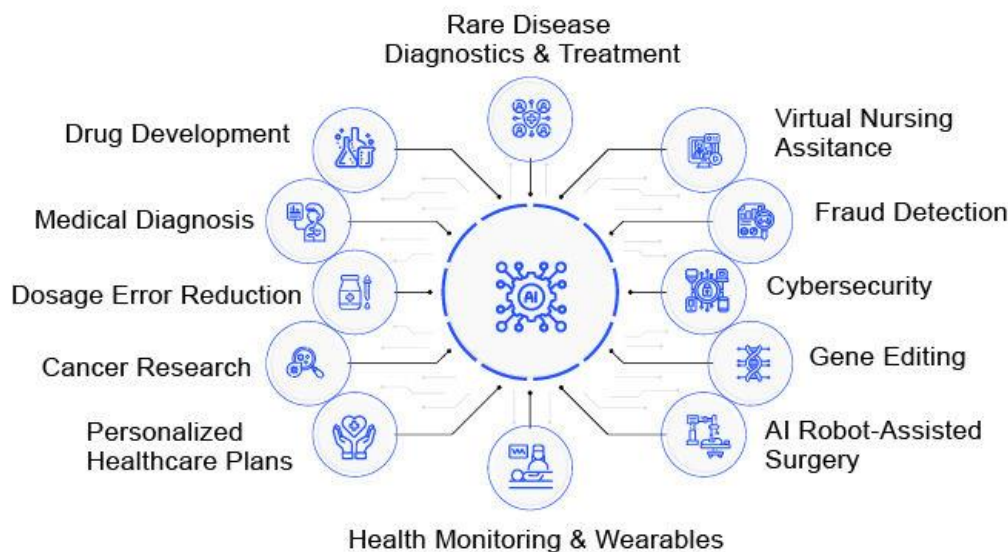
Applications of AI in Healthcare

Figure 4: https://www.delveinsight.com

Smart Strechers

I. Integration of Gps and Tracking Systems for Enhanced Safety

A. Explanation of how GPS integration enhances the safety of rescue operations.

- GPS (Global Positioning System) integration within rescue stretchers has revolutionized the way responders navigate and execute operations in challenging environments. By leveraging GPS technology, these stretchers can precisely determine their location, providing a valuable reference point in situations where traditional landmarks may be absent or obscured. This capability ensures that responders can efficiently reach their destination, reducing the risk of getting lost in unfamiliar terrain.

B. Benefits of real-time tracking and location data for responders.

Real-time tracking is a pivotal feature enabled by GPS integration. It allows incident commanders and rescue teams to monitor the precise location of stretchers and their occupants in real-time. This level of visibility enhances situational awareness, enabling responders to make informed decisions swiftly. Furthermore, it aids in the coordination of multiple teams operating in a rescue scenario, promoting efficient resource allocation and teamwork.

C. Technical details of GPS and tracking system integration.

The technical underpinnings of GPS integration in rescue stretchers involve the utilization of satellite signals to triangulate the stretcher's position. These systems typically consist of GPS receivers, which communicate with satellites, and onboard software for data processing. The collected data, including latitude, longitude, altitude, and timestamp, is transmitted to a central monitoring station via secure channels. Encryption and authentication measures are often employed to safeguard the integrity and privacy of this critical information.

II. Incorporating Telematics for Remote Monitoring and Communication

Telematics technology has become a crucial component in the realm of rescue stretcher innovation. By seamlessly integrating telematics systems, these stretchers are now equipped with advanced capabilities that significantly enhance their effectiveness in emergency situations. In this section, we will delve into the key aspects of telematics technology and how it revolutionizes rescue stretcher functionality.

A. Overview of Telematics Technology and Its Relevance to Rescue Stretchers

- Telematics, in the context of rescue stretchers, refers to the utilization of wireless communication and data transmission systems.
- These systems enable real-time data collection, analysis, and remote control of stretcher functions.
- The relevance of telematics lies in its ability to bridge the gap between on-site responders and off-site medical professionals.

B. How Telematics Enables Remote Monitoring of Vital Signs and Conditions

- Telematics-equipped stretchers are equipped with sensors and devices that monitor vital signs such as heart rate, blood pressure, and temperature.
- Data collected from these sensors is transmitted in real-time to remote medical professionals.
- Remote monitoring allows for early detection of critical changes in a patient's condition, enabling rapid intervention.

C. Communication Features and Their Impact on Coordination During Rescues

- Telematics systems include two-way communication capabilities, facilitating seamless communication between on-site responders and off-site medical experts.
- This communication ensures that crucial information is shared promptly, aiding in decision-making and treatment planning.
- Coordination is improved, leading to more efficient and effective rescue operations.

III. Foldable and Compact Designs for Easy Storage and Transport

Another significant innovation in rescue stretcher technology is the development of foldable and compact designs. These designs have transformed the way rescue stretchers are stored, transported, and deployed in emergency situations.

A. Importance of Compact Design in Rescue Stretcher Technology

- Compact stretcher designs are crucial for saving valuable space in emergency vehicles and storage facilities.
- They allow for easier maneuverability in tight spaces, such as confined rescue environments.
- Compactness ensures that rescue stretchers can be readily available when needed without hindrance.

B. Advantages of Foldable and Portable Stretcher Models

- Foldable stretcher models are designed to be easily collapsible and transportable.
- They reduce the physical footprint of stretchers during transport and storage.
- Portable models are lightweight and can be carried by a single responder, enhancing mobility.

C. Considerations for Storage and Transportation in Rescue Operations

- Proper storage and transportation of rescue stretchers are essential to maintain their functionality and longevity.
- Considerations include securing stretchers to prevent damage during transit and ensuring quick access in emergency vehicles.
- Foldable and compact designs align with these considerations, optimizing stretcher management

IV. Advances in Materials for Improved Durability and Weight Reduction

A. Discussion on the Role of Materials in Rescue Stretcher Innovation

In the realm of rescue stretcher technology, the choice of materials plays a pivotal role in determining the effectiveness and reliability of these critical life-saving devices. Over the years, advancements in materials science have led to significant improvements in both durability and weight reduction. In this section, we delve into the critical role that materials play in the innovation of rescue stretchers.

- **Foundational Importance of Materials**

  Materials are the building blocks of any rescue stretcher. The choice of materials impacts not only the overall strength and longevity of the stretcher but also its weight and portability. In high-stress rescue scenarios, the reliability of the stretcher is paramount, making material selection a primary consideration.

- **Durability and Sturdiness**

  The rigors of rescue operations demand that stretchers withstand harsh environmental conditions and rough handling. Traditionally, stretchers were constructed using materials like steel, which offered exceptional durability but came with a substantial weight penalty. However, modern materials have opened up new possibilities for balancing durability and weight.

B. Benefits of Lightweight Materials for Ease of Handling

Lightweight materials have revolutionized the world of rescue stretchers, making them significantly more maneuverable and user-friendly. This section outlines the advantages of employing lightweight materials in stretcher design.

- **Enhanced Maneuverability**: One of the primary benefits of lightweight materials is the ease with which rescue stretchers can be maneuvered in challenging environments. Rescuers often have to navigate through confined spaces, uneven terrain, or cramped quarters, and the reduced weight of modern materials allows for greater agility.

- **Reduced Fatigue**: When rescue operations extend over extended periods, the weight of traditional stretchers can lead to responder fatigue. The adoption of lightweight materials lessens the physical strain on rescuers, enabling them to maintain their energy levels and effectiveness during critical missions.

- **Faster Response Times**: Lightweight stretchers can be deployed more quickly in emergency situations. The reduced weight simplifies transportation, enabling swift response times that can be crucial in life-or-death scenarios.

C. Examples of Cutting-Edge Materials Used in Modern Stretcher Construction

To illustrate the practical application of advanced materials in modern rescue stretcher technology, let's explore some examples of cutting-edge materials that have been integrated into the construction of these vital tools.

- **Carbon Fiber Composites**: Carbon fiber composites are celebrated for their exceptional strength-to-weight ratio. These materials are increasingly being used in stretcher frames, providing a sturdy yet lightweight foundation for rescue operations. Carbon fiber's resistance to corrosion and high fatigue strength make it an ideal choice for long-lasting stretcher construction.

- **High-Strength Polymers**: High-strength polymers, such as ultra-high-molecular-weight polyethylene (UHMWPE), are gaining prominence in stretcher design. These polymers are not only lightweight but also exhibit impressive impact resistance, ensuring the stretcher can withstand the rigors of challenging rescue environments.

- **Aluminum Alloys**: Aluminum alloys have been a staple in lightweight construction for decades. Their malleability allows for intricate and ergonomic stretcher designs, while their corrosion resistance ensures longevity. Aluminum alloy stretchers strike a balance between weight reduction and durability.

- **Titanium**: Titanium, known for its exceptional strength and corrosion resistance, is finding its way into advanced rescue stretcher designs. While it may be pricier than other materials, its unique combination of properties makes it an attractive choice for specialized rescue applications.

- **Kevlar Reinforcements**: Kevlar, famous for its use in ballistic protection, is now being employed as reinforcement in stretcher fabric. This enhances the stretcher's resistance to tearing and abrasion while keeping weight in check. These examples demonstrate the diverse array of materials that modern rescue stretcher manufacturers have at their disposal. The careful selection of materials allows for the customization of stretchers to suit specific rescue scenarios and requirements, ultimately improving their functionality and reliability.

V. Emerging Trends in Rescue Stretcher Designs and Features

A. Exploration of Recent Trends Shaping the Future of Rescue Stretcher Technology

In an ever-evolving field like rescue stretcher technology, staying abreast of emerging trends is crucial. This section

explores the latest developments that are shaping the future landscape of rescue stretcher design and features.

- **Modularity and Customization**: Modern rescue stretchers are increasingly designed with modularity in mind. This trend allows responders to customize stretchers to meet the specific needs of a given rescue mission. Modules for patient support, harness systems, and equipment attachments can be interchanged as needed.

- **Adjustable Configurations**; Adjustable stretcher configurations have gained popularity due to their versatility. Rescuers can adapt the stretcher to accommodate patients of various sizes or medical conditions, ensuring optimal patient care.

- **Ergonomic Design for Rescuer Comfort**: Ergonomics plays a pivotal role in recent stretcher innovations. Responders often have to carry stretchers over long distances or through challenging environments. Ergonomically designed stretchers reduce the physical strain on rescuers, promoting their comfort and effectiveness.

- **Telematics Integration**; Telematics systems, discussed earlier in this article, are being integrated directly into stretcher designs. This allows for real-time monitoring of patient vital signs, GPS tracking, and communication capabilities, further enhancing the effectiveness of rescue operations.

B. Analysis of Innovative Features Such as Adjustable Configurations and Ergonomic Design

In this subsection, we take a closer look at two innovative features—adjustable configurations and ergonomic design—that are gaining traction in the field of rescue stretcher technology.

- **Adjustable Configurations**: Adjustable stretcher configurations are designed to cater to a diverse range of patient needs. They often feature telescoping frames, allowing for length adjustments. Some stretchers can also be widened or narrowed, providing flexibility in accommodating patients of varying sizes.

- **Ergonomic Design**: The incorporation of ergonomic principles into stretcher design is transforming the comfort and efficiency of rescue operations. Features such as padded handles, adjustable height settings, and ergonomic grips reduce the physical strain on responders and contribute to smoother rescues.

C. Considerations for Adapting to Evolving Rescue Scenarios and Needs

As rescue scenarios evolve and become increasingly complex, stretcher technology must adapt accordingly. This subsection outlines key considerations for manufacturers and responders alike to ensure that stretcher designs meet the evolving demands of modern rescue operations.

- **Multi-Functionality**: Stretcher designs should prioritize multi-functionality, allowing for the seamless integration of additional equipment or accessories as needed. This adaptability ensures that stretchers remain versatile tools in diverse rescue situations.

- **Compatibility with Advanced Medical Equipment**: Given the advancements in medical technology, rescue stretchers should be designed with compatibility in mind. This includes provisions for securing advanced monitoring equipment and life-support systems.

- **Interoperability**: In scenarios involving multiple agencies or organizations, stretcher designs should consider interoperability with existing rescue infrastructure and equipment. This ensures a smooth coordination of efforts during joint operations.
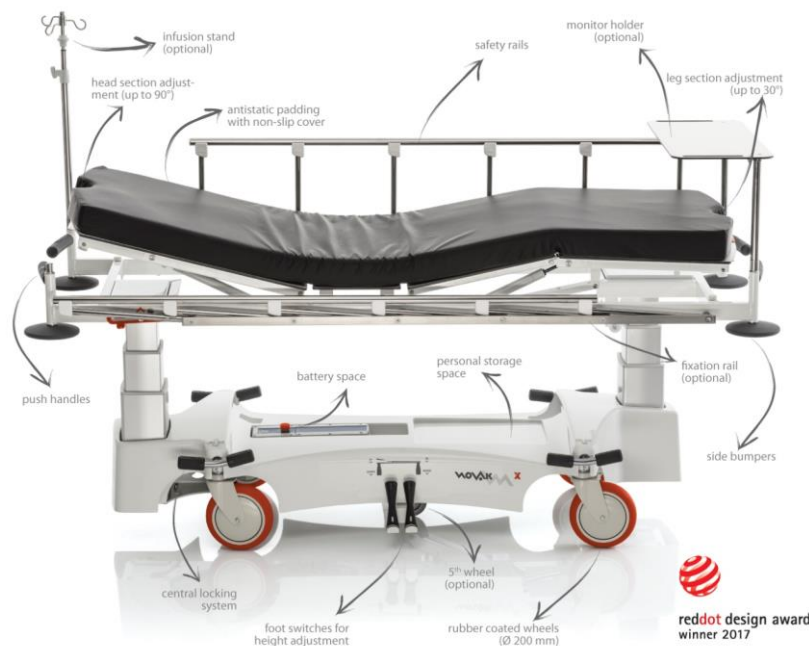
new innovative idea of patient transport 1

Ambulance

Real-time tracking and GPS systems: play a crucial role in improving ambulance service efficiency. By equipping ambulances with GPS devices, emergency response teams can accurately track and monitor their location. This enables efficient dispatching, as the nearest available ambulance can be assigned to a particular emergency. Real-time tracking also helps in avoiding traffic congestion by redirecting ambulances to less congested routes, saving valuable time during emergencies.

Mobile applications: can serve as powerful tools for streamlined communication and coordination in ambulance services. Through dedicated *ambulance service apps*, dispatch centers can easily receive emergency calls, locate nearby available ambulances and assign them to emergencies promptly. These apps can also provide essential information to paramedics en-route, such as the patient's medical history, allergies and any pre-existing conditions. Efficient communication and data exchange through mobile apps enhance the overall quality of care provided during transportation.

Integration of telemedicine and remote medical support: can significantly enhance ambulance services in India. Telemedicine allows medical professionals to remotely assess patients' conditions, provide initial guidance to paramedics and make critical decisions before they reach the hospital. This real-time consultation reduces the risk of misdiagnosis and helps in delivering appropriate care during transportation. Additionally, remote medical support can facilitate communication between paramedics and specialized medical experts, ensuring optimal care for patients with complex medical needs.

Emerging technologies such as drones: can play a vital role in emergency medical transport. Drones equipped with medical supplies and equipment can swiftly reach remote or inaccessible areas, delivering necessary aid before an ambulance arrives. These drones can also provide real-time video streaming, allowing medical professionals to assess the situation and guide on-site responders. Integrating drones into the ambulance service infrastructure can significantly reduce response time and save lives, especially in hard-to-reach regions.

Electronic Health Records (EHR): it has the potential to revolutionize patient information management in ambulance services. By adopting EHR systems, paramedics can have instant access to a patient's medical history, allergies and prescribed medications. This information enables them to provide appropriate treatment and medication during transportation, enhancing patient safety. Seamless data transfer between ambulances and hospitals through EHR systems improves continuity of care and reduces the risk of errors or duplicated medical tests.

Overcoming Infrastructure Limitations: While technology offers immense potential, it is essential to address infrastructure limitations to ensure its effective implementation. Connectivity issues in remote areas need to be resolved to enable real-time communication and tracking. Governments and stakeholders should invest in improving internet connectivity and mobile network coverage, particularly in underserved regions. Additionally, establishing robust communication networks dedicated to emergency services can facilitate efficient communication between dispatch centers, ambulances and hospitals.

Collaboration with Stakeholders: Improving ambulance services with technology requires collaboration among various stakeholders. Governments should take the lead in promoting technology adoption by initiating partnerships with healthcare providers, technology companies and non-governmental organizations (NGOs). Such collaborations can facilitate the development of comprehensive technological solutions and encourage knowledge sharing. Engaging the community through awareness campaigns can generate support and participation, fostering a sense of responsibility towards emergency medical services.

Training and Skill Development: To effectively leverage technology, it is crucial to train ambulance staff in its proper usage. Training programs should focus on equipping paramedics with the skills to utilize technology effectively and efficiently. Special emphasis should be placed on the operation of GPS systems, mobile applications, telemedicine platforms and electronic health record systems. By ensuring that ambulance staffs are trained in utilizing these tools, the overall quality of emergency medical services can be significantly enhanced.

Future Prospects and Recommendations: The future of ambulance services in India holds immense potential with emerging technologies such as artificial intelligence (AI) and Internet of Things (IoT). AI-powered algorithms can help predict emergency hotspots, optimize ambulance routing and provide real-time traffic updates to ambulance crews. Integration of IoT devices can enable seamless communication between ambulances, hospitals and traffic management systems, ensuring a coordinated and efficient response.

New ambulance works as semi hospital 1

Safety In Diagnosis, Treatement and Surgery

1. AI assisted emergency trolley
2. Robotic surgery
3. Patient education programmers
4. Safety precaution
5. Telemedicine

Ai Assisted Emergency Medicine

If we fail to address the urgent matters, serious consequences will emerge. That's what we call as emergencies. On theme of "DAY OR NIGHT WE DO IT RIGHT".AI assisted, enhanced care and treatment to better fight for the lives of those we care, cure. And also, to eliminate the suffering of those we can't.

Innovation Are

- ❖ Unique identification
- ❖ Cross checking of all medication automatically
- ❖ List of emergency drugs based on the disease condition
- ❖ Automated drug calculation, preparation

Robotic Surgery

It is one which are creator of efficiency, removing the barrier of time and effort. Robotic surgery is a method to perform surgery using very small tools attached to a robotic arm. The surgeon controls the robotic arm with a computer. Robotic surgery is similar to laparoscopic surgery. It can be performed through smaller cuts than open surgery. Robotic surgery may

- ♣ Less blood
- ♣ Less scarring
- ♣ Reduced risk of infection
- ♣ Faster return to your lifesaver complications during surgery
- ♣ Shorter hospital stay

Educational Programme
1. Accident Prevaton

> "Prepare and prevent instead of repair and repent."

Concepts in accident prevention

Primary prevention: removal of circumstances causing injury - e.g., traffic speed reduction, fitting stair gates for young children, reducing alcohol consumption.

Secondary prevention: reduces severity of injury should an accident occur - e.g., use child safety car seats, bicycle helmets, smoke alarms.

> **Tertiary prevention:** optimal treatment and rehabilitation following injuries to minimize long-term consequences - e.g., effective first aid, appropriate hospital care.

- ❖ Stratergies
  - ➢ Health education like Manorama
  - ➢ Safety alarm in every vehicle
  - ➢ Drone observation in highly risk area every 2 hours
  - ➢ AI assisted emergency and lifesaving management and treatment

Clinical roles for health professionals in accident prevention

These include:

Advice to patients: health workers such as health visitors can sometimes be well placed to identify accident risks or medical conditions conferring risk and to advise accordingly - for example:

Child accident prevention: Identify hazards (e.g., if a family is being seen by a health visitor at home or if treatment is being sought for

be used for a number of different procedures, including: Coronary artery bypass, cutting away cancer tissue from sensitive parts of the body such as blood vessels, nerves, or important body organs, Gallbladder removal, Hip replacement, Hysterectomy, Total or partial kidney removal, Kidney transplant, Mitral valve repair, Pyeloplasty (surgery to correct ureteropelvic junction obstruction), Pyloroplasty, Radical prostatectomy, Radical cystectomy, Tubal ligation etc.

To operate using the Robotic system, your surgeon makes tiny incisions in your body and inserts miniaturized instruments and a high-definition three-dimensional camera, and sometimes skin incisions are not required at all. Then, from a nearby console, your surgeon manipulates those instruments to perform the operation. Which works on without man power, protects from rays and harmful radiation protection shield. Which also have validation, up to date diagnostic pattern, and evaluate and analyzing the surgery procedure. Minimally invasive are just two fancy words that mean smaller incisions. These types of surgeries mean shorter hospitalization and faster recovery for patients.

Other benefits may be:

- ♣ Less risk of infection
- ♣ Less blood loss and fewer blood transfusions
- ♣ Less pain
- ♣ Faster recovery
- ♣ Quicker return to daily routine

accidental injury). Advise about prevention - e.g., stair gates, keeping chemicals out of reach, etc.

Patients with medical conditions: Identify and treat accident-causing conditions - e.g., obstructive sleep apnea, visual or balance disorders, Sleep disorder, Diabetes, Epilepsy, Attention deficit hyperactivity disorder (ADHD). Give appropriate advice on fitness to drive. Advise patients on how to minimize accident risks from their medical condition. Identify unacceptable risks and intervene where appropriate - for example: Identify vulnerable children and adults with recurrent injuries or at high risk. This includes those who are experiencing neglect and may require child protection procedures. Consider reporting to the **Driver and Vehicle Licensing Agency (DVLA)** patients who fail to comply with medical driving regulations.

- ❖ Preaparatory Methods
  - ➢ Staff management
  - ➢ Network coverage and management
  - ➢ Organization and management
  - ➢ Leadership, teamwork, knowledge development through research
  - ➢ Feeling of responsibility

- ❖ **MEASURES**
  - ➢ Alarm safety in every vehicle like TESLA car, which is having automated problems detected and helps in accident prevention.
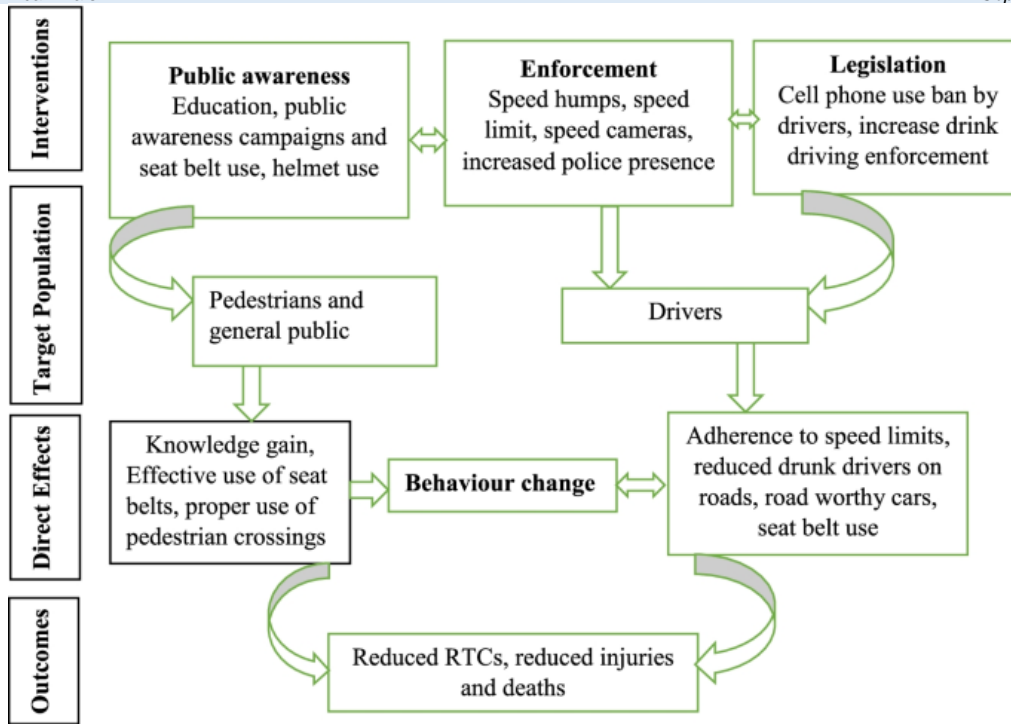
Figure 5: bmcpublichealth.biomedcentral.com

Vaccination

Vaccination is an act of love for ourselves, our families and our communities. We predict that the development of virtually all vaccines licensed from this point forward will involve some form of genetic engineering. Entire viral genomes can now be cloned into bacterial or yeast vectors, allowing manipulation of genes prior to "rescue," or regeneration of infectious organisms in culture. These techniques enable the rapid custom design of organisms for use in vaccines.

➢ INNOVATIONS
  - m-RNA vaccines
  - digitally immune optimised synthetic vaccines
  - expanded disease research programme
  - poster and use of preventive technologies
  - preservation of steam cell

  - school and community health education

Other Innovation Are
  - Use of Peripheral intravascular cannula (PIVC), more commonly called peripheral Intravenous (IV) lines, Advanced Venipuncture Arm (Light Skin Tone) etc.
  - AI assisted robots in clinical setting to give admission, triage, prevention of misidentification, preparation of electrolyte, drugs and fluids according to the condition of the patient.
  - Mainly involvement and application of AI technologies, 3D printing of body image and most importantly CRISPR gene editing, virtual reality and smart bandaging of dressing and wounds and many more innovations are going on…....
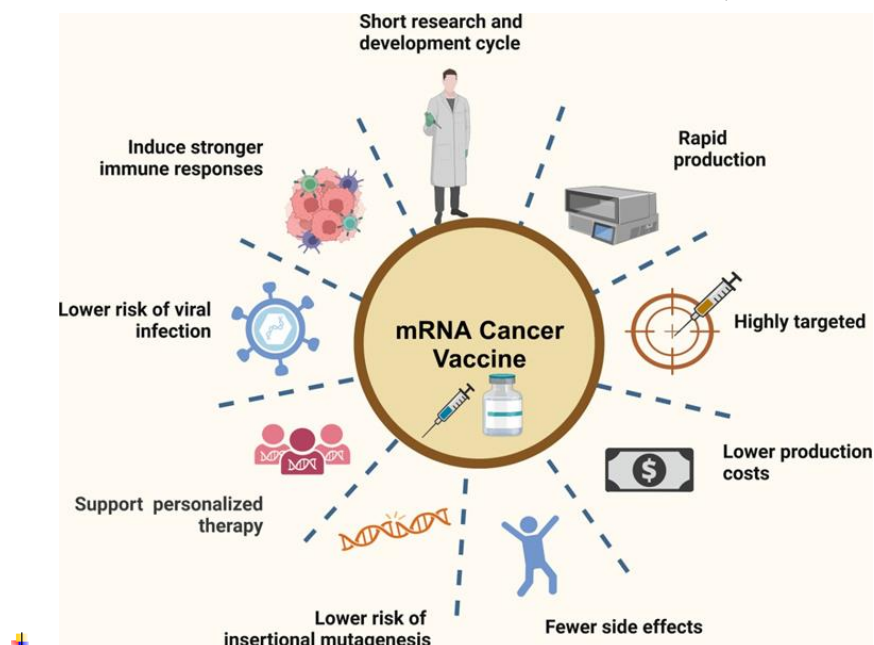

vaccination 1

Crispr Gene Editing

+ CRISPR (Clustered Regularly Interspaced Short Palindromic Repeats) gene editing is a genetic engineering technique in molecular biology by which the genomes of living organisms may be modified. It is based on a simplified version of the bacterial CRISPR-Cas9 antiviral defence system. By delivering the Cas9 nuclease complexed with a synthetic guide RNA (gRNA) into a cell, the cell's genome can be cut at a desired location, allowing existing genes to be removed and/or new ones added in vivo. The technology works by "harnessing the natural mechanisms" of invading viruses and then "cutting out" infected DNA strands. By altering cell mutations, CRISPR also has the potential to transform the way rare conditions like cystic fibrosis and sickle cell disease are treated.

+ Virtual Reality (Vr)

+ The VR and AR (augmented reality) market is booming worldwide, and both technologies are being used increasingly

in healthcare applications. There is a specific type of VRT called virtual reality exposure therapy (VRET), which immerses someone in a 3-D environment that feels extremely real. The technology can be deployed in various ways, such as performing more advanced surgery, helping with pain relief, and treating mental health conditions VR can also help people with mental disorders overcome their fears by providing them a controlled environment for social interactions. Two hours of exposure to treatment for fear of heights cut patient anxiety by an average of 68%, according to Forbes. it's a good option for people who like gaming and are drawn to an immersive experience. Either way, if someone is experiencing depression, anxiety, social anxiety, wants help overcoming a phobia or has PTSD, virtual reality therapy could be worth trying. Which can be mainly used in Pain management, Anxiety, including social anxiety and public, speaking anxiety, Depression, Phobias, PTSD, eating disorders, Grief and loss, substance use disorders and Disorders where compulsive behavior or interpersonal dynamics are significantly impacted.
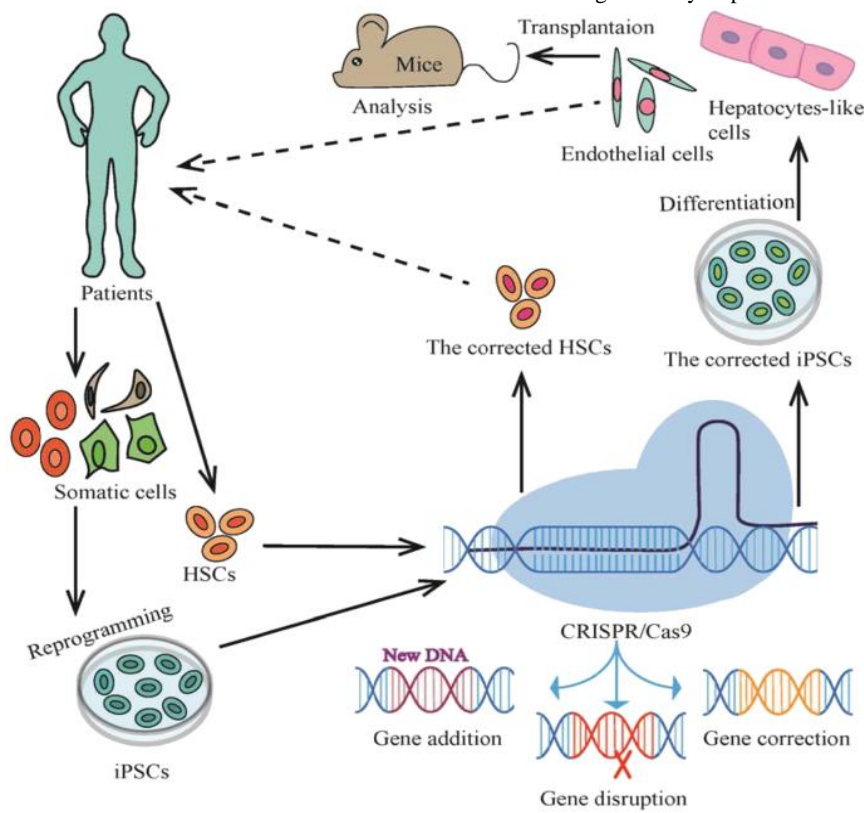

Crispr Technology **1**

Smart Bandages

Optimal wound healing requires a delicate balance of various chemical and physical factors and bandages are often used to achieve the stable environment needed for tissue repair. However, the conventional wound coverings used by providers to constantly **monitor wound temperature, pressure, and moisture** levels are often inefficient. To solve the smart bandages, wound care is now more efficient and effective.

Smart bandages are wound coverings that incorporate technology to help optimize the **tissue repair process**. Smart bandages function via various sensors which **detect, record and regulate physical and chemical**

factors that affect the rate of wound healing. Smart wound bandages may help wound care experts plan for, prognosticate, and manage acute to chronic wounds of various etiologies more effectively than traditional bandages. The functioning of smart bandages depends on the type of sensors integrated within the bandage material. Smart bandages integrate a thin layer of flexible electronics within the bandage which can detect and interpret thermal changes, oxygen/moisture content, as well as pressure variations at the wound site they overlay.The commonest types of sensors incorporated within smart bandages include: **Thermal sensors, Oxygen saturation sensors, Wound pressure sensors, pH sensors, Oxygen Saturation Sensors** etc.
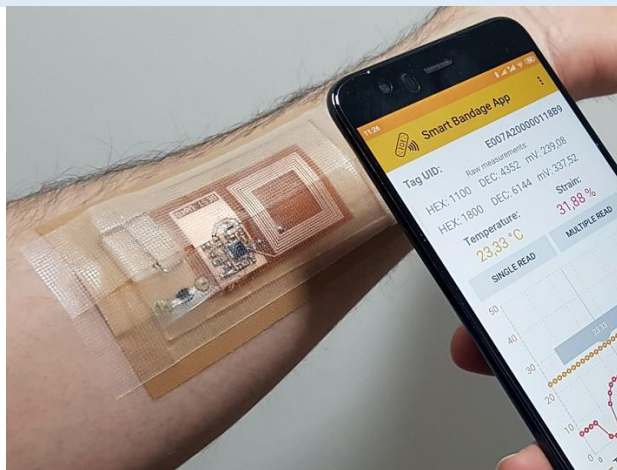
Smart bandage image 1

Biomedical Waste Management

"There is no such thing as away when we throw anything away it must go somewhere"

Biomedical waste (BMW) is any waste produced during the diagnosis, treatment, or immunization of human or animal research activities pertaining thereto or in the production or testing of biological or in health camps. It follows the cradle to grave approach which is characterization, quantification, segregation, storage, transport, and treatment of BMW. Only about 10%–25% of BMW is hazardous, and the remaining 75%–95% is nonhazardous. The hazardous part of the waste presents physical, chemical, and/or microbiological risk to the general population and health-care workers associated with handling, treatment, and disposal of waste.

Innovatives

- QR code bag separation
- Vehicle tracking
- AI assisted waste segregation
- Turning waste into energy and recycle

Plasma Gratification: Plasma, referred to as the "fourth state of matter," is a very high temperature, highly ionized (electrically charged) gas capable of conducting electrical current. Examples of plasma in nature include lightning and gas at the surface of the sun. Plasma technology has a long history of development and has evolved into a valuable tool for engineers and scientists who need to use very high temperatures for new process applications. Man-made plasma is formed by passing an electrical discharge through a gas such as air or oxygen (O_2). The interaction of the gas with the electric arc dissociates the gas into electrons and ions, and causes its temperature to increase significantly, often exceeding 6,000°C, nearly as hot as the sun's surface.Plasma gasification is an extreme thermal process using plasma which converts organic matter into a syngas (synthesis gas) which is primarily made up of hydrogen and carbon monoxide.

Advantages:

- Preventing hazardous waste from reaching landfills
- Some processes are designed to recover fly ash, bottom ash, and most other particulates, for 95% or better diversion from landfills, and no harmful emissions of toxic waste
- Potential production of vitrified slag which could be used as construction material
- Processing of biomass waste into combustible syngas for electric power and heat or for synthesis into fuels or chemicals.
- Production of value-added products (metals) from slag

- Safe means to destroy both medical and many other hazardous wastes.
- Gasification with starved combustion and rapid quenching of syngas from elevated temperatures can avoid the production of dioxins and furans that are common to incinerators
- Air emissions can be cleaner than landfills and similar to that of incinerators.
- Rewards and recognize through web portal system Personnel safety devices
- The use of protective gears should be made mandatory for all the personnel handling waste.
- **Gloves:** Heavy-duty rubber gloves should be used for waste handling by the waste retrievers. This should be bright yellow in color. After handling the waste, the gloves should be washed twice. The gloves should be washed after every use with carbolic soap and a disinfectant. The size should fit the operator.
- **Aprons, gowns, suits or other apparels:** Apparel is worn to prevent contamination of clothing and protect skin. It could be made of cloth or impermeable material such as plastic. People working in incinerator chambers should have gowns or suits made of non-inflammable material.
- **Masks:** Various types of masks, goggles, and face shields are worn alone or in combination, to provide a protective barrier. It is mandatory for personnel working in the incinerator chamber to wear a mask covering both nose and mouth, preferably a gas mask with filters.
- **Boots:** Leg coverings, boots or shoe-covers provide greater protection to the skin when splashes or large quantities of infected waste have to be handled. The boots should be rubber-soled and anti-skid type. They should cover the leg up to the ankle.
- Cleaning devices
- **Brooms:** The broom shall be a minimum of 1.2 m long, such that the worker need not stoop to sweep. The diameter of the broom should be convenient to handle. The brush of the broom shall be soft or hard depending on the type of flooring.
- **Dustpans:** The dustpans should be used to collect the dust from the sweeping operations. They may be either of plastic or enamelled metal. They should be free of ribs and should have smooth contours, to prevent dust from sticking to the surface. They should be washed with disinfectants and dried before every use.
- **Mops:** Mops with long handles must be used for swabbing the floor. They shall be of either the cloth or the rubber variety. The mop has to be replaced depending on the wear and tear. The mechanical-screw type of mop is convenient for squeezing out the water.
- **Vacuum cleaners:** Domestic vacuum cleaners or industrial vacuum cleaners can be used depending on the size of the rooms.
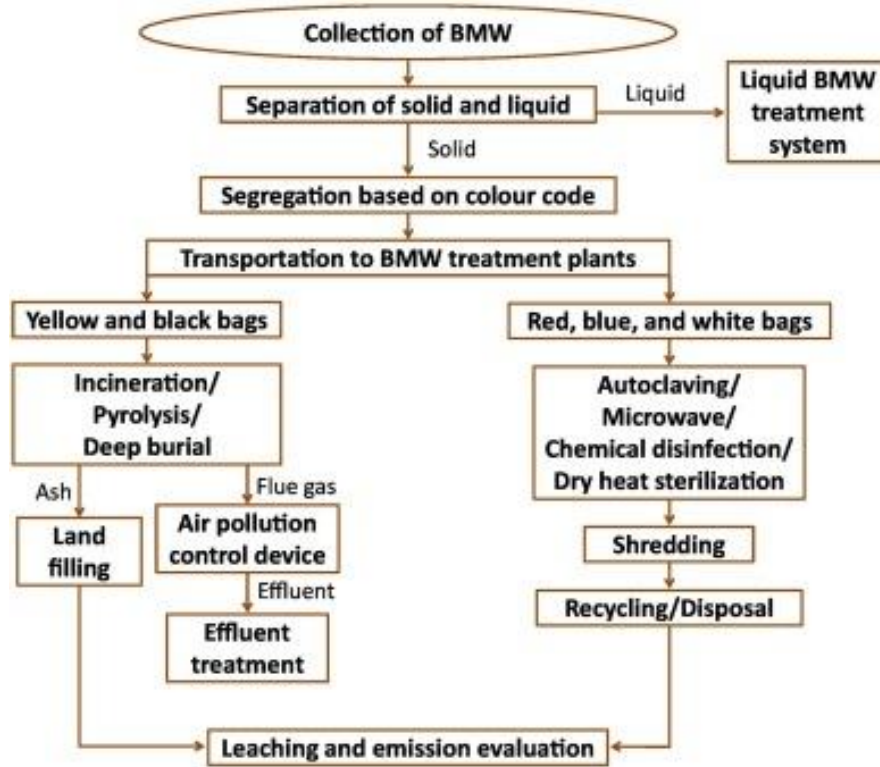
Figure 6

Safety precaution programmers

- ❖ "Our goal is zero harm"
- ❖ Create an opportunity reduce risk
- ❖ Patient feedback system
- ❖ Incident report
- ❖ Staff management
- ❖ Patient safety culture evaluation
- ❖ Identify high risk area
- ❖ Patient education and enjoyment of care
- ❖ Alerts and notification
- ❖ Data security and compliance

- ❖ Government programme implication
- ❖ Falls Prevention, Choking, strangulation and suffocation
- ❖ Burns and scalds
- ❖ Drowning
- ❖ Poisoning
- ❖ Cuts and bumps
- ❖ home, car and outdoor safety
- ❖ fire, driving, road safety etc

Tele Medicine

"Make an impact, with no sound of income."

Telemedicine enables patients to receive medical attention at the convenience of both doctor and him, and at the same time, he is safe. This technology allows people to take blood pressure medicine, refill medications, and recall their appointments and Web-based visits with a doctor or nurse practitioner are another form of interactive appointment. For all scenarios, electronic health technology makes chronic illness control easier by simply placing care monitoring apps and smartphones in the hands of patients. This method is applicable for diagnosis, treatment, prevention, research data evaluation as well in continuing education.
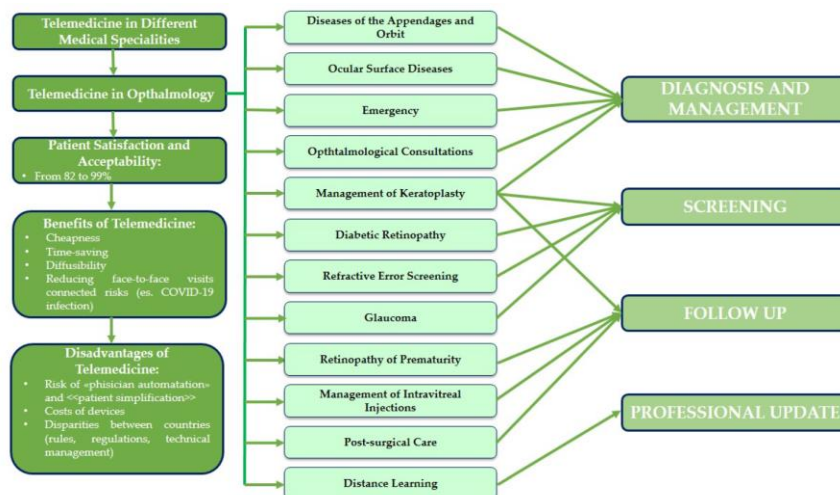

Figure 7: with example in ophthalmological disease

Importance Of Innovation in Health Care

"'Health innovation' improves the efficiency, effectiveness, quality, sustainability, safety, and/or affordability of healthcare. This definition includes 'new or improved' health policies, practices, systems, products and technologies, services, and delivery methods that result in improved healthcare." there are three different kinds of innovation that can make health care better:

a) Consumer-focused: Focusing on the way consumers use health care.

b) Technology-based: Developing new products and treatments.

c) Business model: Focus on integrating different healthcare organizations.

Conclusion

The primary aim of Al in healthcare is to analyse relationships between or treatment techniques and patient outcomes. Al can achieve fast and accurate Diagnostics. It will be very helpful to reduce the human errors as well as the cost of treatment. The challenges experienced in health care came as a result of a wrong approach towards the invention of a new technology system. In their attempt to reduce errors, we have to introduced the new system into their existing structure.

The implementation of the new technology took a longer period since it had to be halted to allow changes to be made. The changes would have been easily made in the structure rather than the new system. Which also helps in Easy access to patient medical records, Reduction in medical errors, Greater patient care, Improved patient education, Reduction in cost etc. We do hope you find this article informative and useful for your studies and practice.

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