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Interdisciplinary Protocols for Comprehensive Bedsore Prevention: Synergising Physiotherapy and Nursing Interventions

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ABSTRACT

Pressure ulcers or bedsores are localized wounding of the skin and the tissue underneath the skin caused by the long-term pressure, particularly in the region of the bony prominence. Their pathophysiology is characterized by prolonged external pressure that is higher than the capillary perfusion pressure (32 mmHg), which results in ischemia, cellular hypoxia, the build-up of toxic compounds and tissue destruction. Damage is aggravated by friction, shear forces and moisture by reducing microcirculation and skin integrity. Development of bedsores has four stages: non-blanchable erythema (Stage I), up to tissue loss through the full thickness of the bedsores, bone or muscle (Stage IV). Immobility, malnutrition, and comorbid conditions (diabetes and vascular disorders) are the key risk factors that decrease tissue resilience and healing ability. Preventive strategies must involve a multidisciplinary approach that incorporates physiotherapy to improve mobility and nursing care to maintain skin integrity, and nutrition to reduce their occurrence. Knowledge of the phases and processes involved in the development of bedsores can be used to prevent and improve patient outcomes.

Keywords: Bedsore, Prevention, Physiotherapy, Nursing, Interdisciplinary Protocols

1. INTRODUCTION

Pressure ulcers, also called pressure injuries or bedsores, are local skin and tissue injuries caused by the prolonged pressure in the area, which may be a bony prominence. They are of great concern both in the hospital and home care environment and they are known to impact immobilized or bedbound patients who cannot position themselves regularly[1]. The epidemiology of bedsores differs in different regions and care setting where research indicates that the prevalence of bedsores goes as high as 10 percent and above in some groups, especially with older or severely ill individuals[2]. As an example, hospital-acquired pressure ulcers are still a prevalent iatrogenic event, and the nursing home residents and home or long-term patients on admission do not display the same risk profile. The multifaceted character of the bed sore development process highlights the importance of interdisciplinary prevention procedures that would complement the nursing and physiotherapy efforts to prevent bed sores. Conventionally considered to be the major nursing task, the latest best practices are characterized by the concept of a multidisciplinary team of specialists incorporating the experience of nurses, physiotherapists, wound care specialists, nutritionists, and other medical specialists. This model seeks to deliver holistic care such as routine risk and skin examinations, repositioning schedules, using pressure relief devices, skin management, nutritional support, and mobilising therapies to prevent pressure injuries and control risk factors in patient-centred care. Physiotherapy is an important modifiable practice in the prevention of bedsore because it helps in early and safe mobilization, improving patient positioning, optimal use of wheelchairs and bed support surfaces, and the development of customized physical activity programs that promote growth and decrease the occurrence of immobility-associated complications. The main focus of nursing interventions is to pay close attention to skin monitoring, to ensure that patients are turned regularly (usually on a two-hour schedule), to keep

their skin clean, to apply prophylactic dressings, and plan the overall care[3]. Interdisciplinary protocols provide the mutual collaboration between nurses and physiotherapists who will help each other and share knowledge and coordinate interventions to provide high-risk patients with the specific preventive care. Disciplinary interdisciplinary approaches are important not just in direct patient care. They facilitate good communication, decision-making, and lifelong learning among the medical practitioners. Interprofessional collaboration is also supported by institutions to allow the distribution of resources, standardization of practices, and inclusion of the patients and their families in the prevention process, which is a key aspect of sustainable management of bedsores. This kind of cooperation has been proved to decrease complication, hospitalization rates, and adverse events including pressure ulcers, which indicates a significant importance of physiotherapy and nursing integration into globally-recognized and evidence-based prevention plans.

Pathophysiology of Bedsores

Pathophysiology of bedsores or pressure ulcers or pressure injuries is mainly characterized by prolonged external pressure that is more than 32 mm Hg above the capillary perfusion pressure which results in ischemia and consequent tissue necrosis. When constant pressure is exerted on the bony prominence, it blocks the blood circulation through the capillary beds, thereby denying the tissues of oxygen and nutrients. This leads to the build up of toxic metabolites and eventual death of cells causing local tissue ulceration. This process is increased by friction and shear forces which destroy superficial layers of skin and the underlying blood vessels. Moisture and maceration also undermine the skin integrity making it prone to development of ulcers. Pressure ulcers progress in stages with the initial stage non-blanchable erythema of normal skin (Stage 1), then loss of epidermis and dermis (Stage 2). Stage 3 related to full-thickness loss of skin that has expanded to subcutaneous tissue but not fascia. Stage 4 is the most severe one that signs complete loss of tissue with exposure of muscles, bones, tendons or other profound structures. These phases emphasize the progressive degree of tissue damage of the superficial to profound, with undermining and tunnelling in the advanced stages[4]. There are several risk factors that cause the emergence of the pressure ulcers. One of the main reasons is immobility since patients who cannot roll to different positions on a regular basis are in constant pressure on their fragile body parts. Tissue damage can be triggered even by a couple of hours immobility. The malnutrition condition is acute as it reduces wound healing and makes skin less strong; the loss of weight and proteins deficiency predispose to ulcers. Tissue perfusion and healing capacity **(Figure 1)** is also compromised by comorbidities like diabetes, vascular disease, cognitive impairments, and chronic illnesses.

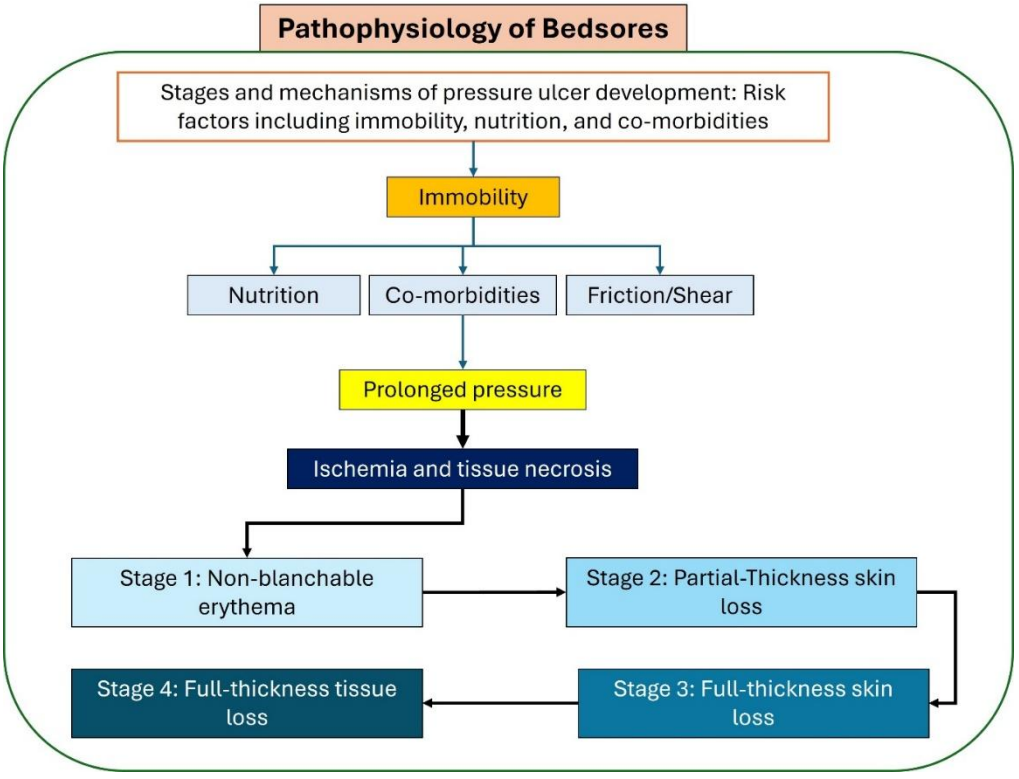

Figure 1:- Flowchart of Pathophysiology of Bedsores showing mechanisms, risk factors, and progression stages.

Others are old age, skin moisture as a result of incontinence, loss of senses, and prior experience of pressure ulcers. These factors are combined to form a high-risk environment that requires keen prevention[5]. The causes of bedsores are ischemic injury due to protracted pressure and aggravated by shear, friction, and moisture. The disease has four clinical phases with

their indicators of tissue loss. Patients are at risk of developing ulcers due to immobility, malnutrition, and comorbidities related to health, with the aim of preventing this disease being to identify its symptoms as early as possible and apply a multidisciplinary approach to prevention.

Traditional Approaches and Limitations

Conventional methods of preventing bedsores have mainly focused on the traditional methods of nursing care, which comprises of regular repositioning of patients, skin observation, linen and topical interventions to curtail skin breakdown. Nurses are instrumental in lessening the compressive pressure on fragile tissues by rotating patients after every two hours, usually, this is done every two hours, to dislodge pressure and avert ischemia. Other interventions included in these involve keeping the skin moist, incontinence control so that the skin is not exposed to as much moisture and the early detection of pressure points and this causes the initiation of proper care. Although such approaches constitute the critical part of the bedsore prevention, they tend to strongly depend on the attention and uniformity of the nursing staff that might be disrupted by the workload and the lack of resources[6]. The most important adjuncts in the traditional bed sore prevention are pressure relieving devices. These apparatuses achieve the effect of reducing sustained pressure in the bony prominences thus enhancing local tissue perfusion. Heel protectors, foam pads and seat cushions are also used to offload the pressure in certain areas. Nevertheless, no substantial proof of the superiority of devices exists, and the cost, tolerance of patients, and possible applicability in clinical practice affect the use of this tool. Although such conventional approaches, single-disciplinary models of prevention have their serious weaknesses. The multifactorial nature of the development of pressure ulcers may not be fully addressed by nursing care. Most of these models fail to integrate with other professionals such as physiotherapy, nutrition and wound care professionals hence leading to poor prevention outcomes[7]. The current framework of prevention of pressure ulcers is based on traditional, bedridden patient care, which focuses on the most of the applied nursing practices and pressure-relieving devices, which prove to be inadequate when applied independently. These approaches have restricted the capacity in terms of fluctuating nursing capacity, uneven prevention strategies, and the incapacity of devices to cover all the risk factors. Consequently, more effective and sustainable bed sore prevention needs integrated interdisciplinary models of care that cross these limitations.

Rationale for Interdisciplinary Care

The logic behind interdisciplinary care on bed sore prevention is that the development of pressure ulcers is a multifactorial process that involves physiotherapy and nurses to work together and maximize patient outcomes. Whereas the traditional nursing interventions are associated with the skin care, repositioning, and risk assessment, the physiotherapy introduces some specialized knowledge in mobility improvement, patient positioning, and therapeutic exercises to deal with immobility, which is the major risk factor of pressure ulcers. Working together enables synergistic implementation of preventive measures where nursing awareness of skin care is incorporated together with the role of physiotherapy which enhances the circulation, muscle strength and functional mobility. This partnership will provide total care which will cover both mechanical and physiological aspects that cause pressure injury. There is evidence to support the expected outcomes of integrated intervention to show that multidisciplinary intervention is the effective strategy in reducing the occurrence of pressure ulcers, their severity, and the complications[8]. Research indicates that interdisciplinary interventions have a great impact on reducing hospital-acquired pressure injuries where nurses, physiotherapy-led mobilization protocols, and standardized prevention bundles are combined and yield significant and sustained reductions in hospital-acquired pressure injuries. Indicatively, a major study demonstrated a significant decrease in the occurrence of sacral pressure ulcers following the introduction of a multipronged interdisciplinary program, which showed better patient outcomes due to the integration of care. Secondly, team-based interventions promote compliance with prevention strategies, patient satisfaction, and rates of wound healing. The results show that integrated physiotherapy-nursing care prevents ulcers at a higher rate but it also increases patient safety and quality of life. Besides clinical advantages, interdisciplinary collaboration generates collective responsibility and communication between the healthcare providers, decreasing the fracture of care delivery and increasing the consistency in preventing health actions. It allows customizing intervention based on the risk factors of patients individually, enhances personnel education, and allows the timely recognition and treatment of the initial tissue damage[9]. This kind of cohesion is necessary because of the complex interaction of factors in the pathogenesis of pressure ulcers, which eventually leads to the interdisciplinary care being the best practice standard of solid and effective pressure ulcer prevention. The mutual role of physiotherapy and nursing in the prevention of pressure ulcers is necessary because of the multifactorial etiology of bedsores and the complementary nature of skills offered by each of the fields. There is strong evidence that interdisciplinary collaboration can lead to better prevention results, minimize the rates of pressure injuries, and improve the quality of patient care, making it an essential tool in managing bedsores.

Physiotherapy-Based Preventive Strategies

Physiotherapy is a key to the prevention of pressure ulcers (bedsores) based on specific measures aimed at increasing mobility, the integrity of joints and muscle, and the optimality of the position of patients. Physiotherapists also undertake full mobility evaluations to establish the functional level of a patient and establish constraints on movement that in turn leads to long-term pressure and subsequent tissue destruction. The tests allow developing personalized care strategies that will help to reduce the risk of immobility. They assess passive and active range of motion (ROM), muscle strength, balance, and

postural stability, which are crucial to promote moving and repositioning. Passive and active range of motions preventive measures involve range of motion exercises. Passive ROM activities are the actions in which the physiotherapist or caregiver rotates the limbs of the patient in their normal range of motion despite the inactivity of the muscles, a process that is used to ensure the flexibility of the joints, decrease the stiffness, and increase the circulation in the area. Active ROM exercise involves voluntary muscle contractions by the patient to stretch the muscles mildly to strengthen them, which facilitates blood circulation and shortens the period of time spent on the weak sections of the skin[10]. Exercise of both types helps in maintenance of musculoskeletal functions, prevention of contractures, and enhancing venous return, which respectively lower rates of pressure ulcer. Physiotherapists also give positioning and body mechanics training in order to get it straight and redistribute pressure. They educate nurses, caregivers, and patients on the best methods of turning and repositioning to prevent shear and friction pressures, and the use of supportive devices and pillows to position them strategically to offload pressure on bony prominence like the sacrum, heels and hips. Training is provided with wheelchair placement protocols as well as bed placement, particularly with regard to alignment that ensures skin preservation and improves comfort. The methods do not only help in preventing pressure injuries, but also lower the chances of musculoskeletal complications such as contractures and pressure neuropathies.

Nursing-Based Preventive Strategies

Prevention methods of pressure ulcers involving nursing activities are based on the main principles of skin care, early screening and detection of risks, and the necessary support of nutritional and hydration levels. Nurses also become sway in recognizing the patients at risk of bedsores using the validated tool of assessing risk like the Braden Scale and the Norton Scale. Braden Scale assesses six areas, namely sensory perception, moisture, activity, mobility, nutrition, and friction/sheet, to categorize the levels of risk in patients, so as to provide timely preventive measures. The Norton Scale also considers physical and mental health, activity, mobility and incontinence to grade the risk. These tools help the nurses focus on creating high-risk patient care and acting as per protocols. Besides risk assessment, the nurses have a role of instituting holistic skin care guidelines that are geared towards ensuring skin integrity and skin breakdown prevention. These involve frequent check-ups on the skin to identify any damage early stage caused by pressure, maintaining clean and dry skin and applying soft cleansing products to prevent irritation. The emollients keep the skin hydrated and cracking is prevented; the moisture caused by incontinence or sweating is controlled, which helps to avoid maceration. High-risk areas should also be covered with appropriate barrier creams and prophylactic dressings and this will help in protecting the skin further[11]. Nurses also make the arrangements in terms of the repositioning schedule, whereby patients are turned often to alleviate the pressure with the help of supportive equipment such as cushions and mattresses. Nutrition and hydration are two preventive aspects that are part of nursing. Malnutrition is a major problem concerning wound healing and predisposition to pressure ulcers, and nurses should evaluate the nutritional condition and cooperate with dietitians to guarantee the appropriate caloric and protein consumption depending on the individual requirements. Sufficient fluid consumption is also a necessity to ensure skin turgor and the optimal tissue perfusion. When needed, the nutritional supplementation promotes the repair of tissues and the immune abilities. The application of hydration management minimizes skin dryness and improves pressure and shear-resistance capabilities. The combination of nutritional and hydration interventions provides nurses with systemic factors causative of pressure ulcer development and local skin care.

Integrated Physiotherapy-Nursing Protocol Design

A combined physiotherapy-nursing intervention in bedsores prevention implies cooperation based on joint assessment models, organized scheduling, and the smooth interdisciplinary documentation and communication. This model is a holistic and continuous care of patients that integrates the best of the two fields. Joint assessment models start with common comprehensive assessment through which nurses utilize risk screening devices such as the Braden or Norton Scale to establish patients who are at risk whereas the physiotherapists conduct comprehensive mobility evaluations that assess the range of motion, muscle strength, and functional status. The combination of these assessments gives a multidimensional picture of the patient risk factors both systemic and mechanical so that the team can create the personalized prevention plans that will meet the specific needs of the patients. Frequent interdisciplinary case reviews allow revising risk categories and intervention priorities, making it easier to provide specific care. Timed mobility and skin examination are also coordinated to increase the preventive efficiency. Nurses and physiotherapists also work together on timed care plans which incorporate repositioning plans with mobility and skin tests. As an illustration, active or passive range of motion supervised by physiotherapy is consistent with scheduled turning by the nursing staff to optimize the effect of pressure relief and circulation. This synchrony minimizes lapses in care, decrease overlap and ensures uniformity in monitoring of the skin integrity and functional mobilization. Scheduling is also effective in utilizing the resources of the staff and comfort of the patients by the reduction of the disruptions and preserving the preventive objectives[12]. The continuity and accountability are of vital importance to cross-disciplinary documentation and flow of communication. Integrated electronic health records (EHR) or patient unified charts are employed wherein nurses and physiotherapists record their assessments, interventions as well as response of the patient in real time. The information exchange between the multidisciplinary meetings, handoffs, and digital alerts are the communication channels that facilitate the rapid transfer of information concerning the changes in the state of patient, the occurrence of risks, or the required changes in the care plan. This openness facilitates clinical decision-making, avoids fragmentation of care, and builds a team spirit culture. Providing the healthcare providers with communication

protocols and shared documentation standards also enhance the compliance with protocols and quality assurance[13]. A combined physiotherapy-nursing plan of preventing the occurrence of pressure ulcers is based on joint-related risk, mobility measurement, coordination of time-justified intervention, and efficient cross-disciplinary dialogue and reporting. This multidisciplinary structure will make use of complementary knowledge to provide a comprehensive, patient-centred care improving early detection, prompt intervention, and successful prevention of bedsores.

Technology Integration in Bedsore Prevention

Smart pressure sensors, telemonitoring devices, AI-enhanced robotics, and other technologies are being used to rapidly integrate technology in bedsores prevention to enhance patient care and minimize the incidence of pressure ulcers. The smart pressure sensors incorporated in the mattress or cushions or wearable devices continuously measure the pressure distributions over the high-risk areas such as the sacrum and heels. These detectors are sensitive to excessive and protracted pressure and will send real-time data to caregivers or automated equipment in order to send timely alerts of repositioning. State-of-the-art systems can perform machine learning to detect the pattern of pressure and predict the risk of ulcers, allowing proactive response to the situation before the tissue damage can occur. Telemonitoring devices ensure that the prevention of pressure ulcers is not limited to the traditional care environment as it allows students to monitor and treat vulnerable patients remotely. These systems monitor patient location and movement using sensors and cameras and transmit the information to healthcare providers who may evaluate the skin integrity and compliance with repositioning regimes remotely. The use of telehealth in post-discharge care particularly in treating spinal cord injury patients demonstrate great potential in the prevention of pressure ulcers by providing early signs of the condition and allowing timely intervention with the help of video conferencing and remote monitoring[14]. AI and robotics are able to improve the practice of bedsores prevention by automatic procedures like patient repositioning and 1:1 pressure adjustment. AI-powered robotic beds can also automatically change the hardness of mattresses and support surfaces in response to sensor inputs and efficiently redistribute pressure to susceptible tissues. Exoskeletons and robot repositioners are used to help mobility impaired patients reposition themselves safely and frequently and increase their reliance on the nursing staff and improve their mobilization compliance. AI models can be used to improve the preventive efficacy of repositioning and pressure relief protocols based on patient-specific data, reducing caregiver workload. The application of technology based on smart sensors, telemonitoring, and AI-driven robotics greatly supplements conventional methods of bedsores prevention as it offers 24/7 monitoring, the ability to identify risks early, remote control, and automated treatment. These technologies foster better patient safety, efficient resource utilization, and outcomes by lowering the occurrence and incidence of pressure ulcers by timely and data-driven care.

Case Studies and Clinical Evidence

The interdisciplinary approach of differentiating between nursing and physiotherapy to prevent the occurrence of pressure ulcers has been adopted in many rehabilitation centers with an incorporation of risk-assessment, mobility-assistance, skin-care, nutrition, and pressure-relieving devices. Such pilot models prove more effective in the reduction of pressure ulcers incidence and patient outcomes in comparison with traditional single-discipline protocols.

Real-world studies:-

Two facilities using SOLUTIONS program involving interdisciplinary care in a quasi-experiment found pressure ulcer incidence reduced by 87% and 76% respectively after 5 months and were statistically significant (p=0.02)[15]. The use of Multidisciplinary team-based care within the rehabilitation environments enhanced compliance with the prevention measures and reduced by a large percentage the occurrence of hospital-acquired pressure injuries as opposed to traditional nursing care[16]. A systematic review brings to the fore the fact that multiple interventions in interdisciplinary care used as a bundle have better outcomes compared to the single intervention[17]. Continuous bedside pressure mapping studies that used interdisciplinary team coordinated repositioning showed statistically significant pressure ulcer incidence reductions in ICU and rehabilitation patients[18]. Clinical experience reports on practice indicate that the key to effective pressure ulcer management lies in combined care plan, including joint evaluation, constant monitoring, and patient-centered intervention[19]. Comparison between interdisciplinary and conventional care protocols results are below based on the selected works are mentioned below in **Table-1**:

Table 1:- Comparison between interdisciplinary and conventional care protocols results.

Study (Year)	Setting	Intervention Type	Pressure Ulcer Incidence Reduction	Key Findings
SOLUTIONS Program (2008) [15]	Two healthcare facilities	Interdisciplinary program	87%, 76% reduction (p=0.02)	Significant reduction in pressure ulcers with multidisciplinary protocols

Talsma et al. (2011) [20]	Hospital unit	Feedback report + interdisciplinary care	Significant decrease in PU incidence	Real-time feedback improved prevention practices
Suva et al. (2018) [21]	Hospital setting	Multidisciplinary approach	Improved clinical outcomes	Emphasized economic and care quality benefits with integrated teams
J Baggerly et al. (1995) [22]	Rehabilitation center	Nursing + prevention protocol	Reduced incidence	Structured nursing and rehab intervention reduced pressure ulcer rates
Clarkson P et al. (2023) [19]	Rehabilitation center	Interprofessional care	Improved knowledge and outcomes	Occupational therapy and nursing collaboration improved prevention knowledge and practices

Inter-disciplinary pilot models that involve physiotherapy and nursing interventions in rehabilitation facilities show better results in terms of preventing pressure ulcers, as opposed to the traditional single-disciplinary interventions. These models have achieved high decreases in the occurrence of ulcers by means of teamwork in co-ordinated risk analysis, mobilisation, skin care and monitoring, which culminates in the best practice of comprehensive care of bedsores and their management.

Challenges and Implementation Barriers

The issue and obstacles of interdisciplinary bedsores prevention protocols implementation are complex in nature and considerably influence the quality-of-care delivery. The problem of staffing is one of the most urgent ones, and numerous healthcare institutions, particularly in rehabilitation centres and in long-term care facilities, are understaffed with trained nurses and physiotherapists. It causes a workload, less time to carefully assess the patient, repositioning, and mobilisation, and obstructs compliance with prevention schedules. Short staff also influences the interchangeability of care and heightens the chances of omission of interventions. The lack of communication between nurses, physiotherapists and other team members also creates barriers towards success in the implementation of protocols. Such loopholes can be caused by the absence of role definition, the absence of standardised communication methods, and inconsistency in the documentation. Lack of interdisciplinary communication contributes to disjointed care, redundancy or failure to offer interventions, and slow response to patient needs. Hierarchical structures, insufficient interprofessional training, and lack of frequent multidisciplinary meetings or case discussions, necessary in team coordinated care planning, usually discourage effective team collaboration. There are also training deficits which are also very harnessing. The nursing and physiotherapy staffs need to be constantly educated on the best practices in pressure ulcer prevention such as risk assessment tool, positioning, mobility promotion, and application of emerging technologies. Nevertheless, training initiatives can be inadequate, random or non-specific to multidisciplinary teams[23]. This shortage lowers the confidence of staff and their competence, which causes inefficient preventative care. The absence of information about the value of interdisciplinary teamwork also undermines the adherence to combined practices. The implementation is a problem with patient compliance, especially in cases of people with cognitive disabilities, pain, or discomfort. Patients can be reluctant to be moved, or perform mobility practice as a result of fear, exhaustion, or an incorrect perception of care objectives. The challenges associated with compliance need a flexible approach to communication, patient education, and motivation, which entail more staff time and expertise. Low levels of involvement by patients and their families in prevention plans also impact adversely on adherence and outcome.

Future Research Directions

Future research activities in the area of the prevention of the bedsores outline the acuity of the evidence synthesis gaps, as well as the necessity to meet the emerging technologies of digital physiotherapy and global harmonization of the nursing standards. In spite of significant improvements, current evidence is characterized by the current limitations such as inconsistent risk assessment tool accuracy, inadequate high-quality trials of individual versus bundled interventions, and lack of representation of some patient groups like patients with spinal cord injuries or in intensive care. There is a significant evidence gap to synthesize of more comprehensive evidence to inform precision prevention based on specific patient-related factors because the existing models tend to implement generic risk instruments with minimal predictive ability. Future research ought to consider the use of population-specific risk algorithms, which consider physiological, mobility and biochemical markers to enhance a better early identification and targeting of preventive strategies[24]. Introducing digital

physiotherapy as a part of bedsores prevention is an outstanding new study field. There are potential in wearables, sensor technologies, and tele-rehabilitation, which enable monitoring mobility remotely, in real-time, and tailor interventions. Studies are required to determine the effectiveness, utility and cost-efficiency of these digital physiotherapy interventions in clinical practice with issues of patient compliance and workflow consistency. Other directions include AI-based risk prediction based on dynamic risks and robot-based repositioning to increase mobilisation compliance. International standardisation of nursing in respect of pressure ulcer prevention should continue. The differences in training, guidelines application, and availability of resources in different regions compromise the quality and fairness of care. Global partnerships, including the National Pressure Ulcer Advisory Panel (NPUAP) and the development of international guidelines, aim to develop evidence-based and flexible nursing guidelines. Further studies are needed to determine the effects of harmonised standards on clinical outcomes, training of healthcare workers, and adherence to guidelines and consider methods to educate and engage with patients culturally. The gaps in evidence synthesis, further development of the integration of digital physiotherapy technologies, and global harmonisation of nursing standards are the areas where future research in the prevention of bedsores is needed. The following priorities will help to develop accuracy, creativity, and fairness in a holistic approach to pressure ulcer prevention and eventually enhance safety and quality of life across the world.

2. CONCLUSION

The overall approach to prevent bedsores should involve the interdisciplinary collaboration between physiotherapy and nursing as the fields that can combine their knowledge to prevent bedsores. Nurses are critical in screening of risk at the earliest stage, skin management, and maintenance of optimum nutrition and hydration. Physiotherapists also contribute through carrying out an in-depth mobility test, passive and active range of motion exercises, and positioning and body-mechanisms training, to minimize risks factors associated with immobility. When integrated together, the disciplines provide a strong framework in which the multifactorial causes of pressure ulcers are tackled in a better manner compared to single-disciplinary models. Multidisciplinary design through the involvement of joint assessments, coordinated mobility and skin inspection and cross-disciplinary communication leads to consistent and comprehensive care delivery. High-tech innovations, including smart pressure sensors, telemonitoring devices, and AI-based robotics, are also integration of cutting-edge technology that can further improve prevention initiatives through real-time monitoring and assistance in the repositioning process. The greater benefits in interdisciplinary care versus traditional interventions have been strongly supported with evidence provided in numerous clinical studies and pilot models within rehabilitation centres with evidence of high incidence rate reduction of the pressure ulcers and has resulted in better patient safety and quality of life. Several challenges are still observed such as staffing issues, communication barriers, lack of training and patient compliance issues and this requires strategic implementation efforts.

The way forward in research is to bridge evidence synthesis gaps, combine digital physiotherapy innovations and ensure equitable and quality care by harmonizing global nursing standards. The future of the prevention of bedsores is technology-assisted, collaborative, patient-centred interdisciplinary protocols that are continuously developing at the expense of new evidence and innovation. The culture of holism is essential to the development of pressure ulcer prevention and the subsequent improvement of clinical outcomes and the reduction of the healthcare burden of the preventable disease

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