

EDITORIAL

REHABILITATION: HEALTH RESEARCH PERSPECTIVES AND CHALLENGES

Talat Mirza¹, Zartaj Ahmed¹

¹Department of Research, Ziauddin University, Karachi.

Policy drives practice and Health Services Research is at the intersection of policy, practice and patient outcomes. Health Services Research in relation to disability has to reform targets to add value to rehabilitation in a policy relevant context. Medical rehabilitation research is directed towards restoration and improvement of functional capabilities lost due to injury, disease or congenital disorders along with the development of new and improved assisted technologies. Fostering stake holders' engagement in this regard ensures patient centered focus. The crucial information from all the pertinent fields for rehabilitation generates a hub of innovative strategies leading to commercialization in Health Services Research (HSR). The investigation revolves around current resources available in this field with identification of gaps for capacity building and connectivity between all the stake holders for a meaningful bonding, making health care reforms a reality.

Rehabilitation is a vital component of health services. It includes a group of interventions which intend to optimize function in those disabled and suffering from diseases so that they can interact better with their environment by living, working and learning to their best capability. There is a growing need for rehabilitation today as populations age and the occurrence of non communicable diseases and injuries increase¹. The World Health Organization (WHO) reported an estimated 15% of the world's population suffering from mental or physical disabilities². Rehabilitation research being a multidisciplinary venture requires strong collaboration among a good range of fields and specialties including a few such as ergonomics, biomechanics, and physical medicine, biomedical engineering and computer sciences. Rehabilitation researchers are practitioners and investigators in the science of recovery. The level of investigation could be molecular, cellular, tissues, organ systems, the whole body or psychological domains. WHO also recognizes rehabilitation as one of its key priorities in 2017 with focus on research to not only make the cost benefits of rehabilitation known and measuring its impact but also to identify the barriers in accessing rehabilitation facilities and their underutilization along with predicting the need for health professionals required in this area³.

Medical rehabilitation deals with a coordinated multidisciplinary approach to disability through a physician directing a management plan of disabling diseases and injuries. The strategy includes skilled rehabilitation nursing care, physical therapy, speech and audiology, prosthetic and orthotic devices, social, recreational and psychological services. For example, in stroke patients, physiotherapists assist in musculoskeletal issues where as speech therapists deal with language and swallowing, and occupational therapists help patients return to their daily activities².

Corresponding Author

Dr Talat Mirza

Dean Research,

Department of research, Ziauddin University Karachi.

Email: deanresearch@zu.edu.pk

Physical medicine and rehabilitation, is also known as physiatry or rehabilitation medicine. A physiatrist is a physician who works towards augmenting and restoring functional ability and quality of life to those with physical impairments or disabilities. They aim to optimize a patient's ability to carry out activities of daily living, thereby improving their quality of life rather than finding a cure for their condition. Physiatrists have a wide range of knowledge including cardiovascular, neurological, musculoskeletal and rheumatologic systems, with a multidisciplinary approach and are trained to work in concert with a team of social workers and other allied health therapists.

Neuro rehabilitation focuses on restoration of function in patients suffering from nervous system disorders in order to improve disease related impairments, disabilities and quality of life. In addition, ground breaking research regarding neural repair which utilizes the potential of neural stem cells to regenerate has been used to target diseases such as major depression and neurodegenerative conditions such as Alzheimer's⁴. The use of robotics has helped in promoting labor saving exercises for rehabilitation of stroke patients; however, they are seldom utilized in clinical practice⁵. Deep Brain Stimulation (DBS) also known as a "brain

pacemaker" approved by the FDA for management of Parkinson's disease, dystonia and obsessive-compulsive disorder. It involves implanting a device that stimulates either the surface or the inner portion of the brain to affect the functioning of neural circuits that are involved in the condition⁶.

Cardiopulmonary rehabilitation with this science of recovery, intends to prolong life and improve physical functioning, symptoms, health-related quality of life by improving breathing in patients with COPD and other lung diseases⁷, increasing exercise tolerance post coronary revascularization even though it does not improve diastolic function and in patients post MI who are diabetics and non-diabetics^{8,9} along with the ability to cope with daily activities. It also teaches patients the correct use of medications and oxygen thereby reducing hospitalizations.

There has been a change in mindsets regarding cancer rehabilitation, as cancer is now a chronic condition with better survival rates, rather than being an acutely lethal condition as it was regarded previously¹⁰. Rehabilitation of cancer patients involves counseling, advice on change in lifestyle and behavior, psychological support, social welfare questions, methods of coping with side-effects of the anti-cancer and other treatments¹¹. In a study by Holm et al one third of cancer patients reported a need for psychological rehabilitation¹². Psychological rehabilitation involves the use of interventions such as psychotherapy and cognitive behavioral training to support cancer patients for example women suffering from breast cancer who have shown to have increasing levels of anxiety and depression compared to the normal population¹³. In addition, post-surgical rehabilitation such as post mastectomy exercise rehabilitation in breast cancer patients has been proven to reduce lymphedema as stated in a review article by Loh et. al¹⁴. Moreover, menopausal rehabilitation provides women with the psychological support that they need to adapt to the changes along with the use of exercises to prevent and manage the symptoms of osteoporosis caused by loss in bone density¹⁵.

Speech and language therapy aims to help a hearing-impaired listener make sense of the auditory world. Moreover, vestibular rehabilitation/ balance retraining therapy is a proven therapeutic approach for the treatment of persistent dizziness and postural instability. Speech and language therapy after a stroke can help with problems such as aphasia, dysarthria, verbal apraxia and dysphagia. Advances in technology have assisted in cost effective aphasia rehabilitation of stroke patients through the development of computer based programs that aim at improving function in single language domains such as reading, naming, writing, sentence production and processing or multiple domains¹⁶.

Rehabilitation engineering focuses on designing and developing devices to assist individuals with their disabilities such as robotics that can help with mobility training. This innovation can be especially useful for people living in rural areas who may not have access to traditional trainers and rehabilitation facilities. Robotic technology can speed up recovery of disabled. A wide variety of rehabilitation assisting robots have been developed from complex to simple systems. Examples of such devices for the lower limb include treadmill gait trainers, foot plate gait trainers, ankle rehabilitation¹⁷. Robotic therapy is now used not only for stroke patients but also for those suffering from cerebral palsy, multiple sclerosis and Parkinson's disease¹⁸. Virtual simulation devices that use virtual reality simulation exercises for rehabilitation can be monitored by a therapist without the patient leaving his home, known as virtual rehabilitation. Moreover, physical prosthetics such as artificial legs with powered ankles, exoskeletons and dexterous upper limbs have revolutionized rehabilitation. Sensory prosthetics such as cochlear implants and retinal chips which mimic photoreceptor cells and can potentially be used to reverse blindness^{19,20}. Pakistan is now working towards ensuring access to assistive products and conducting provisional workshops on such technology³.

The application of molecular biology and genetics to rehabilitation defines the molecular mechanisms of disease, injury, recovery as well as clinical effectiveness of therapies. Therefore, genomics will assist in identification of new potential targets and responsiveness to rehabilitative therapeutic modalities. Rehabilomics is a new model in rehabilitation which analyzes an individual's biologic (genetic, transcriptomic, proteomic, epigenetic) characteristics which can affect the outcome of rehabilitation and the treatment decision. It is known that rehabilitation needs to be tailored according to the patient's specific physical, cognitive, emotional and social needs rather than following a standardized plan. The new model of Rehabilomics aims at finding serum biomarkers that can be used to individualize therapy by allowing objective subject stratification and determining which factors affect recovery²¹. Traumatic brain injury and spinal cord injury are areas where Rehabilomics research is contributing to rehabilitation research. Several genomic, proteomic and hormonal biomarkers have been found in traumatic brain injury however they require validation before their use in clinical practice²².

Despite the advances in rehabilitation, national development policies in many South-Asian countries have

inadequately tackled the concerns of individuals with disabilities²³. Rehabilitation medicine is no longer a slow moving empathic discipline. Instead it is a rapidly developing field ranging from bench to bedside care in the acute illness to integration into the community¹⁰. Rehabilitation research is uniquely positioned to integrate and translate knowledge across the health sector at large. Though there seems to have been a significant increase in rehabilitation facilities in Pakistan many centers still need to incorporate a multidisciplinary approach. There is a drive to enhance the effectiveness of rehabilitation practices through research with a focus on improving functional ability in individuals with disability and behavioral adaptation to functional losses, expansion of improved assisted technology and understanding of the whole body systems responses to physical and functional impairments through a scientific outcome based approach. The objective is to inculcate the element of research and evidence based practice in Pakistan for rehabilitation in all disciplines of medicine in relation to the advances in science and technology

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