DIH Motek a DIH brand Hocoma a DIH brand

INDUSTRY INSIGHT

5 REASONS TECHNOLOGY IS THE FUTURE OF THE REHABILITATION SYSTEM

Striking the balance between therapy demand and available resources

INTRODUCTION

As new technologies advance aspects of our modern world, they are also capable of improving medical practice. For example, advancements in medical devices have revolutionized patient care in recent decades. New technologies also wield immense power in the world of rehabilitation medicine.

SUMMARY

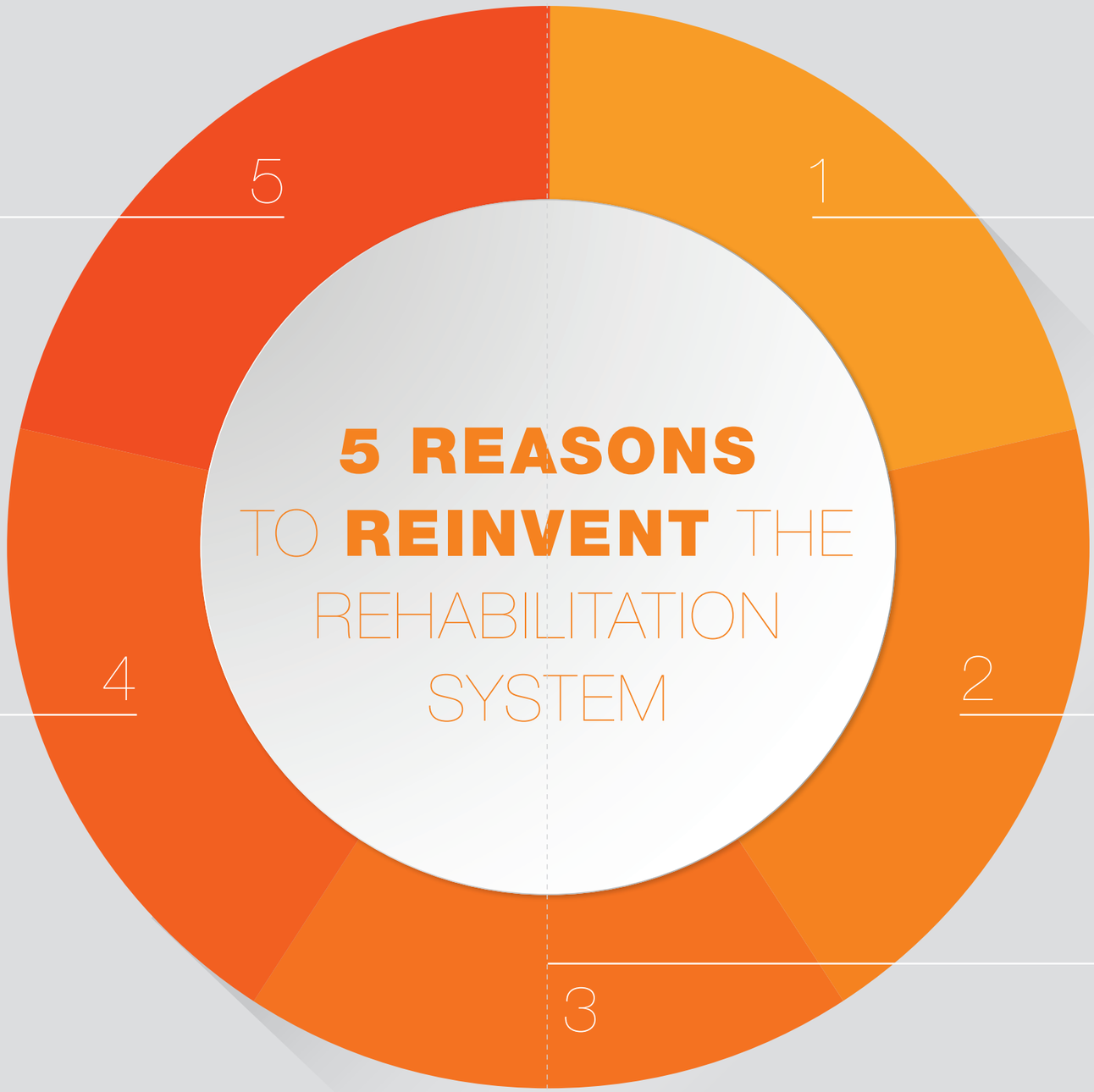
In this document we examine the effects of an ageing population on healthcare resources and demonstrate how technology, such as robotic rehabilitation devices, can provide solutions for rehabilitation facilities worldwide.

We breakdown how global demographic changes will increase the number of people living with chronic and neurological diseases and associated healthcare costs, as well as explore how an ageing population will put further strain on physical and occupational therapists.

Finally, we will look into how technology can provide clinical benefits through developments such as automated technology in healthcare and machine-led repetitive tasks that help enhance patient outcomes, preserve a vulnerable workforce, and provide cost-effective results.

INDUSTRY INSIGHT

WHY THE NEED TO **REINVENT THE REHABILITATION SYSTEM?**



CLINICAL
BENEFITS

DEMOGRAPHIC
CHANGES

5 REASONS TO **REINVENT** THE REHABILITATION SYSTEM

LACK OF HUMAN
RESOURCES

INCREASING
NEUROLOGICAL
DISEASES

INCREASING
HEALTHCARE
COSTS

There are 5 general reasons emphasizing the need to reinvent the rehabilitation system; structural changes in the healthcare system are needed to improve the cost, efficiency and sustainability of our current model.

1 DEMOGRAPHIC CHANGES

The so-called “silver tsunami” is a coined phrase representing the **rapidly aging global population**. As the population majority ages, many individuals will need the increasing care for heart disease, stroke, falls and fractures, among a host of other complications. Furthermore, declining levels of physical activity with age, according to surveys in the United States, increases risk for injury and illness in older populations.[1]
By 2030, the global population aged 60 years and older is projected to increase from over 900 million to 1.5 billion individuals.[13] Some experts are already warning countries about the beginning of a health-care crisis -- where the needs of the population are far too great for the current systems to handle. With the population of stroke survivors anticipated to reach 70 million by 2050, **more support for rehabilitation is critical**.[14]

2 INCREASING NEUROLOGICAL DISEASES

There are many reasons why neurological diseases are on the rise -- one of which is the rapidly increasing age of the majority of the global population, The World Health Organization (WHO) estimates that neurological disorders affect more than 1 billion people across the world.[2] People are living longer but with more disabilities. **Contemporary health care systems are well equipped to stop death, but are less equipped to treat chronic diseases**. Namely, "communicable neurological disorders in low-income countries,” have been “replaced by chronic [neurological diseases] in the high-income ones.”[3] Despite falling death rates, “the burden of non-mortal suffering during a long life with a disease grows," said Vasily Vlassov, Professor at the Higher School of Economics.[3] In essence, a wide variety of neurological diseases can be improved with rehabilitation therapy.

Patients struggling with all different neurological conditions could benefit from rehab including individuals affected by:

. Stroke and Transient ischemic attack

. Muscular dystrophy, cervical spondylosis, Guillain-Barré syndrome

. Alzheimer’s, Parkinson’s, Huntington’s disease

. Traumatic Brain Injury, Spinal Cord Injury, Cerebral Palsy

MORE
REHABILITATION
HELP
IS CRITICAL

3 INCREASING HEALTHCARE COSTS

As more and more aging individuals will need care, it is likely that healthcare costs will also rise unless current medical systems are significantly reconfigured. Many treatments for chronic diseases have a high economic burden on healthcare systems.
As of 2010, healthcare costs in Europe for neurological diseases amounted to 798 billion Euros — approximately one-third of the overall health care spending budget.[15] Acute stroke costs per person are approximately 21,000 euros per person, and amount to 26.6 billion across the continent.[15] A longitudinal cohort study conducted in England on the cost for long-term care in neurorehabilitative cases found that the average cost of care for the first 6 months was £27,905 and fell to £24,803 for months 7-12. Further, people with progressive conditions and significant disabilities had rising occupational healthcare costs, among others, over time.[4]

4 LACK OF HUMAN RESOURCES

As it stands, a shrinking rehabilitation workforce is insufficient to cope with the proposed increase in health care services that will be necessary to care for a large aging population. To attenuate this supply versus demand gap, new technology can bear the burden of tedious rehabilitation tasks – ultimately helping individuals who require more therapy to recover from stroke, falls and other medical events. Doctors surveyed in Italy, Norway, Switzerland and the United Kingdom reported perceived difficulties for their patients to find adequate rehabilitation services.[8] Therapist-to-patient time is critical to improve clinical rehabilitation outcomes. A systematic review of 13 different studies found that this therapeutic relationship is an independent predictor of rehabilitation outcomes. However, **repetitive tasks involved in rehabilitation therapy can easily be supported by to a sophisti-cated machine** while allowing the therapist to focus on beneficial patient interactions and feedback.[9]

REDUCE
HEALTHCARE
OVERHEAD
COSTS

NOT ENOUGH
THERAPIST,
LIMITED THERAPY
TIME

5 CLINICAL BENEFITS

Robotic rehabilitation devices can improve patient outcomes and bear the weight of the impending health needs of our aging population. Therapists are a finite resource with a unique set of skills; their time and efforts are better used for clinical decision-making and complex therapeutic applications while intelligently automated technology can assist with repetitive tasks. Furthermore, enhanced features can improve mobility for patients who need additional assistance getting back on their feet. Research has shown that robot-assisted rehabilitation is effective and in some cases, has superior clinical outcomes than conventional therapies.[10, 5, 6, 16]

There are many cost-related benefits of robot-assisted rehabilitation. For instance, the initial economic investment in automated technology may be higher than conventional therapies, but can pay for itself in 2-3 years.[7] Furthermore, a systematic review of 5 studies found that the cost-effectiveness of robot-assisted rehabilitation programs was superior to conventional therapies.[11] In clinical practice, the physical strain put on therapists during conventional therapies can also be a limiting factor, particularly for patients with severe physical impairments. Robot-assisted rehabilitation is not only cost-effective, but adds quality elements like virtual reality, objective measurements and tailored physical support, which add benefits to care, including:[12]

TECHNOLOGY BRINGING THERAPIST AND PATIENTS CLOSER

GAMIFYING CARE

A concept that not only entices pediatrics patients, but can help increase intensity via patient motivation and real-time feedback in patients of all ages

EMPOWERMENT

Patients feel more independent and in control of their care

CHALLENGE

Training can be adapted to the status of the patient, both cognitive and physical

FEEDBACK

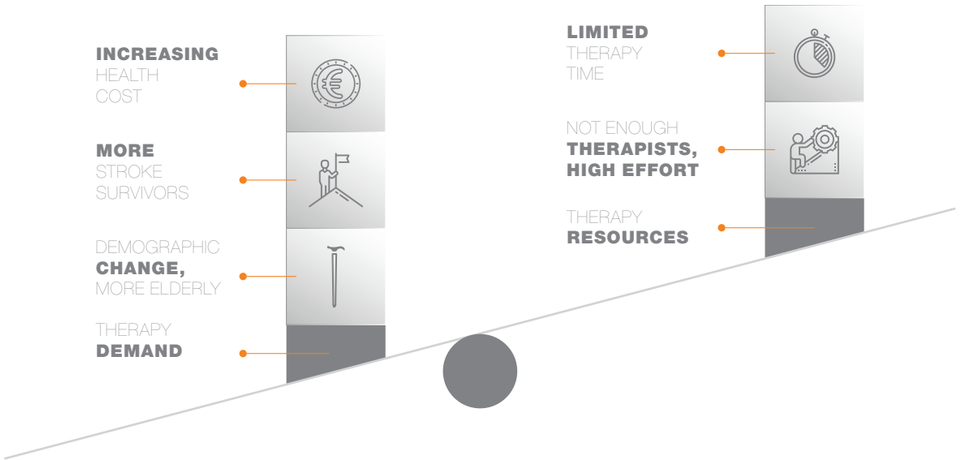
Patients are aware of both large and small improvements

REMOTE CARE

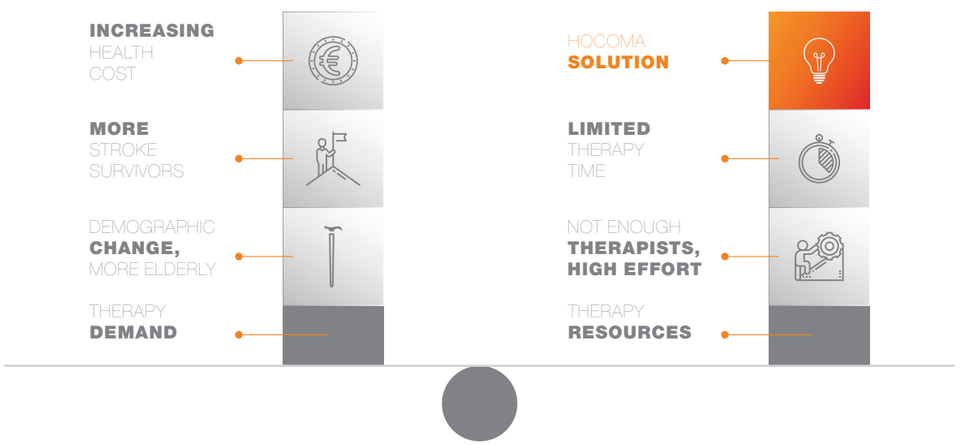
Allows patients to continue therapy at home after discharge and allows therapists to monitor if exercises have been executed

As the landscape of rehabilitation medicine changes with the pending explosive growth of the aging population, more feasible models are needed to accommodate the growing need for therapy. Technology provides a tangible, functional, and clinically and economically effective answer.

CHALLENGES IN REHABILITATION IMBALANCE BETWEEN THERAPY DEMAND AND RESOURCES



WITH ROBOTIC REHABILITATION SOLUTIONS YOU CAN MAXIMIZE YOUR THERAPY RESOURCES AND BALANCE THE SCALE



REFERENCES

[1] Prohaska T, Belansky E, Belza B, Buchner D, Marshall V, McTigue K, Satariano W, Wilcox S. Physical activity, public health, and aging: critical issues and research priorities. J Gerontol B Psychol Sci Soc Sci. 2006 Sep;61(5):S267-73. doi: 10.1093/geronb/61.5.s267. PubMed PMID: 16960240.

[2] World Health Organization. “Conclusion and Recommendations.” Neurology. https://www.who.int/mental_health/neurology/chapter_4_neuro_disorders_public_h_challenges.pdf?ua=1

[3] Valery L Feigin et al, Global, regional, and national burden of neurological disorders during 1990–2015: a systematic analysis for the Global Burden of Disease Study 2015, The Lancet Neurology(2017). DOI: 10.1016/S1474-4422(17)30299-5

[4] Jackson D, McCrone P, Mosweu I, Siegert R, Turner-Stokes L. Service use and costs for people with long-term neurological conditions in the first year following discharge from in-patient neuro-rehabilitation: a longitudinal cohort study. PLoS One. 2014;9(11):e113056. Published 2014 Nov 17. doi:10.1371/journal.pone.0113056

[5] Mehrholz, J., M. Pohl, T. Platz, J. Kugler and B. Elsner (2018). "Electromechanical and robot-assisted arm training for improving activities of daily living, arm function, and arm muscle strength after stroke." Cochrane Database Syst Rev 9: CD006876.

[6] Mehrholz, J., S. Thomas, C. Werner, J. Kugler, M. Pohl and B. Elsner (2017). "Electromechanical-Assisted Training for Walking after Stroke (Update)." Cochrane Database Syst Rev 5: Cd006185.

[7] Morrison, S.A., Financial Feasibility of Robotics in Neurorehabilitation. Top Spinal Cord Inj Rehabil, 2011. 17(1): p. 77-81.

[8] O'Neil O, Fernandez MM, Herzog J, Beorchia M, Gower V, Gramatica F, Starrost K, Kiwull L. Virtual Reality for Neurorehabilitation: Insights From 3 European Clinics. PM R. 2018 Sep;10(9 Suppl 2):S198-S206. doi: 10.1016/j.pmrj.2018.08.375. Epub 2018 Aug 16. Review. PubMed PMID: 30121365.

[9] Amanda M. Hall, Paulo H. Ferreira, Christopher G. Maher, Jane Latimer, Manuela L. Ferreira, The Influence of the Therapist-Patient Relationship on Treatment Outcome in Physical Rehabilitation: A Systematic Review, Physical Therapy, Volume 90, Issue 8, 1 August 2010, Pages 1099–1110,

[10] Lo K, Stephenson M, Lockwood C. Effectiveness of robotic assisted rehabilitation for mobility and functional ability in adult stroke patients: a systematic review. JBI Database System Rev Implement Rep. 2017 Dec;15(12):3049-3091. doi: 10.11124/JBISRIR-2017-003456. Review. PubMed PMID: 29219877.

[11] Lo K, Stephenson M, Lockwood C. The economic cost of robotic rehabilitation for adult stroke patients: a systematic review. JBI Database System Rev Implement Rep.2019 Apr;17(4):520-547. doi: 10.11124/JBISRIR-2017-003896. PubMed PMID: 30973526.

[12] O'Neil O, Fernandez MM, Herzog J, Beorchia M, Gower V, Gramatica F, Starrost K, Kiwull L. Virtual Reality for Neurorehabilitation: Insights From 3 European Clinics. PM R. 2018 Sep;10(9 Suppl 2):S198-S206. doi: 10.1016/j.pmrj.2018.08.375. Epub 2018 Aug 16. Review. PubMed PMID: 30121365.

[13] Beard JR, Officer A, de Carvalho IA, et al. The World report on ageing and health: a policy framework for healthy ageing. Lancet. 2016;387(10033):2145–2154. doi:10.1016/S0140-6736(15)00516-4

[14] Norrving B, Barrick J, Davalos A, et al. Action Plan for Stroke in Europe 2018-2030. Eur Stroke J. 2018;3(4):309–336. doi:10.1177/2396987318808719

[15] Gustavsson, Anders, Svensson, Mikael, Jacobi, Frank, et al. Cost of disorders of the brain in Europe. European Neuropsychopharmacology. 2011; 21, 718–779. https://www.braincouncil.eu/wp-content/uploads/2015/07/Cost-of-Disorders-of-the-Brain-in-Europe-EurNeuro2011.pdfdoi:10.1177/2396987318808719

[16] Straudi S, Baluardo L, Arienti C, et al. Effectiveness of robot-assisted arm therapy in stroke rehabilitation: An overview of systematic reviews. NeuroRehabilitation. 2022;51(4):559-576. doi: 10.3233/NRE-220027

Hocoma
a DIH brand

For more than 20 years, Hocoma has been a **world leader in pioneering** the field of robotic rehabilitation: robots that are now in more than **70 countries**, in the top rehabilitation hospitals and clinics - and that have **impacted millions of lives** globally. Featured in everything from scientific publications such as The Lancet and Journal or NeuroEngineering and Rehabilitation to TechCrunch and The Oprah Magazine, Hocoma is on a mission to **reinvent rehabilitation** now and for the future. Proudly founded, manufactured and engineered in Volketswil, Zurich, Hocoma is part of the DIH family of companies **advancing medical technologies** around the world.

Find out more or get in touch: www.hocoma.com

DIH

DIH stands for the vision to “Deliver Inspiration & Health” to improve the functioning of millions of people with disability & functional impairments. DIH is a global solution provider in blending innovative robotic and VR technologies with clinical integration and insights. Built through the mergers of global-leading niche technologies providers like HOCOMA - a Switzerland-based global leader in robotics for rehab, and MOTEK - a Netherlands-based global leader in sophisticated VR-enabled movement platform powered by real-time integration, DIH is positioning itself as a transformative total smart solutions provider and consolidator in a largely fragmented and manual-labor-driven industry.

Learn more: www.dih.com

Motek
a DIH brand

With over 20 years pioneering the advancement of rehabilitation technology, Motek products and technologies can be found in the most **forward-thinking research facilities, top hospitals** and **stand-out clinics**, changing lives for the better daily. From universities to the military, augmented reality to games-for-good development, Motek innovations are used for cutting-edge movement treatment and research **across the globe**.

Learn more: www.motekmedical.com