

Developing a rigid frame wheelchair in Brazil

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Purpose: Describing the development process of a rigid frame wheelchair using user-centered and open innovation approaches, as envisaged by the WHO Wheelchair Guidelines.

Methods: Unstructured interviews and group discussions with conveniently sampled active wheelchair users oriented the initial brief, product design and selection. The initially approved prototype was subject to ISO 7176 tests, leading to further product adjustments. The long-term follow-up was inclusive of a new group of purposively selected active wheelchair users and measured user satisfaction and safety, as well as user mobility and wheelchair fitting. Data on user satisfaction, safety and effectiveness was produced using QUEST 2.0 and WHO Wheelchair Service Training Package's forms and checklists in Portuguese.

Results: Iterative design and selection led to a prototype that was found appropriate by multiple stakeholders. ISO testing ensured its safety and durability. Follow-up trials included 40 active wheelchair users, who used the studied wheelchair for at least two months. They were 80% male, on average 36.3 years old, and had received their rigid frame wheelchair approximately 4.7 years after disability onset. 92.5% of them had SCI, 7.5% had bilateral transfemoral amputations. Users' assessments showed satisfaction with products (4.4) and services (4.1). Users spent an average of 4.2h/day sat in their wheelchairs. 7.5% and 20% of users reported pressure sores and falls, respectively.

Conclusion: A user-centered, open innovation approach led to the development of a good quality, affordable, and acceptable rigid frame wheelchair model that increased the range of manual wheelchairs available through the Brazilian public healthcare system.

" IMPLICATIONS FOR REHABILITATION

- The feedback of rehabilitation professionals with respect to new products' features is fundamental in order to understand how these devices will be adequately serviced and delivered to users.
- Engaging users of assistive products and rehabilitation professionals in developing new and innovative products facilitates the iteration and selection of the best project alternatives and saves considerable time and resources.
- Rehabilitation professionals are in the best position to work with user of assistive products and other stakeholders, such as the industry and research and development centres, to identify the impact of new assistive products in users' functionality, acknowledging their conditions and environments and exploring their potential.
- Working with users and other stakeholders from different backgrounds and areas of expertise makes the motto "Nothing about us, without us" real. Working towards improving functionality often requires developers to challenge the usual top-down development process in order to adopt a user-centered perspective.