The importance of the user's cognitive skills and opinions in evaluating the outcome of assistive technologies – The ATTAIN Protocol

C. Costantini[a,b*], R. Daini[a,b], M. Ramella[b], J. Jonsdottir[b], R.M. Converti[b], C. Salatino[b]

[a]*Department of Psychology, University of Milan-Bicocca*
[b]*IRCCS Fondazione Don Carlo Gnocchi ONLUS*
***Corresponding author:** c.costantini3@campus.unimib.it

Abstract
The longitudinal observational pilot study ATTAIN (Outcomes of ICT Assistive Technology in RehabiliTAtIoN Pathways) aims to improve the quality of prosthetic intervention and verify the adequacy of assistive devices and measurement outcomes. Fifty patients needing prosthetic interventions for Augmentative Alternative Communication, computer accessibility, and environmental control are being recruited within the DAT Unit of the Fondazione Don Carlo Gnocchi "IRCCS S.Maria Nascente" in Milan. At baseline (T0), a physician and a psychologist perform a clinical evaluation and the AT outcome assessment. The participants will be contacted for the follow-up phase (T1) 3 to 6 months after receiving the assistive solution. At T1, clinicians will re-administer the AT outcome assessment. In order to make the assessment accessible to all participants, these tests and questionnaires are administered on Windows PCs, using Grid3 software, or on a specifically created accessible web page.
Keywords
ICT AT, AAC AT, AAL AT, Assistive Technology, Outcome Assessment

Context

The World Health Organization (WHO) defines assistive technologies (AT) as the fourth pillar of global health and the impact of AT interventions as one of the main priorities in research. Nonetheless, there is still very little evidence of the real impact of AT on patients' daily life [5]. When the recipients of AT are patients with communication deficits or difficulties in computer accessibility, it is much more complex to administer the tests and questionnaires. Indeed, decision-making ability assessments rely heavily on verbal expression, which is problematic for patients with communication difficulties who cannot express their thoughts verbally [4]. Furthermore, traditional test administration methods (paper and pencil) are rarely accessible. In this framework and based on evidence from a previous study (OMAT) [1], we have developed the longitudinal observational pilot study ATTAIN (Outcomes of ICT Assistive Technology in RehabiliTAtIoN Pathways) that aims to improve the quality of prosthetic intervention and verify the adequacy of assistive devices, and measurement outcomes.

Methodology

Fifty patients in need of prosthetic interventions for Augmentative Alternative Communication (AAC), computer accessibility, and environmental control (for example, communicators, facilitated keyboards, mouse emulators, eye pointers, accessibility software, and remote controls for home control) are being recruited within the DAT Unit of the Fondazione Don Carlo Gnocchi ONLUS "IRCCS Santa Maria Nascente" in Milan. At baseline (T0), a physician administers the Barthel Index 20 [9], the Modified Cumulative Illness Rating Scale (CIRS) [7], the ICF Generic Core Set-7, the ICF-core set for profiling communicative competence for AAC AT assessments or the ICF-Vocational Rehabilitation Brief Core Set integrated with some items of the Comprehensive one for ICT AT [14]. A psychologist assesses patients' cognitive status using the Oxford Cognitive Screening (OCS) [10], the CPM-Coloured Progressive Matrices [12], the Palm and Pyramid Trees Test – short version [2], the Aachener Aphasie Test (AAT) subtest on written and oral comprehension of words and sentences [8], and the Multiple Features Targets Cancellation (MFTC) [11]. In order to make the cognitive assessment accessible to all participants, these tests are administered on Windows PCs, using The Grid3 software, or on a specifically created accessible web page. According to the clinical and cognitive assessment, the health practitioner decides whether to administer the assessment protocol to the patient or the closest relative. The AT assessment protocol includes at baseline (T0): the EQ-5D-5L questionnaire [6] for quality of life and the Individual Prioritised Problems Assessment (IPPA) [13] to assess the importance and severity of the problems the participants expect to improve with the AT use. The DAT multidisciplinary team conducts the AT assessment,

and the most appropriate assistive solution is identified, prescribed, or suggested. The assistive devices received are classified according to the international standard ISO 9999:2016 and the Ministry of Health Prosthetics and Assistive Products List (DPCM 12/01/2017). The participants will be contacted for the follow-up phase (T1) 3 to 6 months after receiving the assistive solution. At T1, clinicians will administer the IPPA, ICF Core Sets, EQ-5D-5L, and Quebec User Evaluation of Satisfaction with Assistive Technology Questionnaire (QUEST) [3]. Appropriate descriptive statistics will summarize quantitative data (mean, standard deviation, median, and ranges). Qualitative data will be summarized in contingency tables.

Results and Discussion

ATTAIN researchers implemented the cognitive test battery and the IPPA, QUEST, and EQ-5D-5L questionnaires on the Grid3 software or a dedicated accessible web page. Specifically, neuropsychological tests provide an overview of the patient's cognitive functions and investigate specific aspects helpful in identifying the most appropriate assistive solution. The evaluation of the patient's ability to understand written language can, for example, drive the choice of alphabetic or symbolic communication vocabulary. Similarly, assessing the ability to explore objects in space can facilitate the customization of-communication software. In addition, the possibility for patients to interact with accessible tests and questionnaires allows them to express their own opinion on the impact of AT in their daily life.

Conclusion

In conclusion, the ATTAIN study aims to improve the quality of prosthetic intervention by introducing clinical scales and patients' ability to express their opinion through AT outcome assessment accessible instruments.

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References

[1] Borgnis, F., et al. (2022, July). Assessing the Outcome of Mobility Assistive Technology (OMAT) in Daily Living: Preliminary Results in an Italian Sample. In Computers Helping People with Special Needs: 18th International Conference, ICCHP-AAATE 2022, Lecco, Italy, July 11–15, 2022, Proceedings, Part II (pp. 534-541). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-031-08645-8_64

[2] Breining, B. L., et al. (2015). A brief assessment of object semantics in primary progressive aphasia. *Aphasiology*, 29(4), 488-505. https://doi.org/10.1080/02687038.2014.973360

[3] Demers, L., et al. (2000). Item analysis of the Quebec user evaluation of satisfaction with assistive technology (QUEST). *Assistive Technology*, 12(2), 96-105. https://doi.org/10.1080/10400435.2000.10132015

[4] Graham, M., et al. (2015). An ethics of welfare for patients diagnosed as vegetative with covert awareness. *AJOB Neuroscience*, 6(2), 31–41. https://doi.org/10.1080/21507740.2015.1014072

[5] Gutenbrunner, C., et al. (2015). The Global Disability Action Plan 2014-2021 of the World Health Organisation (WHO): a major step towards better health for all people with disabilities. Chance and challenge for Physical and Rehabilitation Medicine (PRM). European journal of physical and rehabilitation medicine, 51(1), 1-4.

[6] Janssen, M. F., et al. (2013). Measurement properties of the EQ-5D-5L compared to the EQ-5D-3L across eight patient groups: a multi-country study. Quality of life research: an international journal of quality of life aspects of treatment, care and rehabilitation, 22(7), 1717–1727. https://doi.org/10.1007/s11136-012-0322-4

[7] Linn, B. S., et al. (1968). Cumulative illness rating scale. Journal of the American Geriatrics Society, 16(5), 622-626. https://doi.org/10.1111/j.1532-5415.1968.tb02103.x

[8] Luzzatti C., et al. (1996) Aachener Aphasie Test (AAT) Versione italiana, Seconda edizione. Organizzazioni Speciali, Firenze.

[9] Mahoney, F. I. (1965). Functional evaluation: the Barthel index. Maryland state medical journal, 14(2), 61-65.

[10] Mancuso, et al. (2016). Italian normative data for a stroke specific cognitive screening tool: the Oxford Cognitive Screen (OCS). Neurological sciences: official journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology, 37(10), 1713–1721. https://doi.org/10.1007/s10072-016-2650-6

[11] Marra, C., et al. (2013). The Multiple Features Target Cancellation (MFTC): an attentional visual conjunction search test. Normative values for the Italian population. Neurological sciences: official journal of the Italian Neurological Society and of the Italian Society of Clinical Neurophysiology, 34(2), 173–180. https://doi.org/10.1007/s10072-012-0975-3

[12] Raven, J., et al. (1998). Raven manual, Section 2 (Coloured Progressive Matrices). Oxford, England: Oxford Psychologist Press.

[13] Wessels, R., et al. (2002). IPPA: Individually prioritised problem assessment. Technology and Disability, 14(3), 141-145. https://doi.org/10.3233/TAD-2002-14310

[14] World Health Organization. (2001). International classification of functioning, disability and health: ICF. World Health Organization.