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Stroke and aphasia rehabilitation:
A comparison of international guidelines

Abstract: Cerebrovascular diseases are the leading cause of morbidity and mortality worldwide. Unfortunately, Bulgaria leads most countries in its incidence of stroke. Furthermore, a substantial number of Bulgarian patients post-stroke present with persisting communication disorders, especially aphasia. The main purpose of the present study is to conduct an evidence-based theoretical review of leading international guidelines for treatment and rehabilitation of adult stroke patients. In particular, this theoretical overview compares the current Bulgarian guidelines with those developed by the United States of America, Europe, Australia, Canada, the United Kingdom, and New Zealand. The Bulgarian guidelines for the prevention, diagnosis, and treatment of cerebrovascular diseases strongly recommends pharmacological treatment, which is commensurate with international standards. Nationally, a range of different language tests are currently used in post-stroke aphasia.
Keywords: stroke, guidelines, aphasia, comparative study

Rehabilitacja poudarowa oraz rehabilitacja afazji. Studium porównawcze międzynarodowych wytycznych

Streszczenie: Choroby naczyniowo-mózgowe należą do najczęstszych przyczyn zgonów na świecie. Bułgaria nie jest w tej kwestii wyjątkiem. Po przebytym udarze znaczna liczba Bułgarów i Bułgarek zmaga się z nieustępującymi zaburzeniami komunikacji, a zwłaszcza z afazją. W artykule dokonano przeglądu wiodących, międzynarodowych wytycznych określających leczenie oraz rehabilitację osób po przebytym udarze mózgu. W szczególności skupiono się na porównaniu wytycznych stosowanych obecnie w Bułgarii z tymi funkcjonującymi w innych krajach Europy, w Stanach Zjednoczonych, Kanadzie, Australii i Nowej Zelandii. Jak się okazuje, wytyczne bułgarskie – oparte na prewencji, diagnostyce oraz leczeniu chorób naczyniowo-mózgowych – obejmują przede wszystkim leczenie farmakologiczne. Znajduje to odbicie w standardach przyjętych w innych krajach. Istotną funkcję pełni także szeroka gama testów w różnych językach stosowana w leczeniu afazji poudarowej.
Słowa kluczowe: udar mózgu, wytyczne, afazja, studium porównawcze

Cerebrovascular diseases are the leading cause of morbidity and mortality worldwide. Unfortunately, this is especially happening in Bulgaria (European Commission, 2019). Among those who have survived a stroke, many people have varying degrees of disability and need daily care and assistance from their family, loved ones, and the society in general. Stroke is also the second most common cause of dementia (Horner, Norman & Ripich, 2007; Norman, Horner & Ripich, 2007), the most common cause of epilepsy in old age (Myint, Staufenberg & Sabanathan, 2006; Hemphill et al., 2015), and a common cause of depression (Ellis, Zhao & Egede, 2010; Robinson & Jorge, 2016). A substantial proportion of stroke patients have persistent communication disorders, particularly aphasia (Berthier & Pulvermuller, 2011; Plowman, Hentz & Ellis, 2012; Flowers, Skoretz & Silver, 2016).

In Bulgaria, the mortality rate due to cerebrovascular diseases (CVD) is particularly high (i.e., 270,1 for men and 265,1 for women per 100 000). This fact results in substantial social, health, and economic problems in a country with an aging population. Annually, 82,398 cases of CVD are registered, 40,000 of which are diagnosed with stroke. Of these, 28,600 survive yet between 25 to 50% of patients are diagnosed with aphasia or other communication disorders (Миланов, Стаменова & Касо (2018, p. 2). Following stroke, patients with aphasia need timely, effective, and empirical speech and language intervention. Included in rehabilitation teams, speech therapists assist patients with aphasia in order to recover the blocked function and, thus, improve their quality of life. In different countries, the so-called national guidelines for stroke care and therapy serve as the official documents that ensure a patient's access to high-quality medical and therapeutic services. Unfortunately, medically-oriented speech-language pathology (as a subspecialty treating aphasia patients in hospital settings) is still developing in Bulgaria. The primary purpose of thisarticle is to focus on the most effective international practices, and juxtapose them with the Bulgarian experience.

Aim

The main purpose of this article is to conduct an empirical review of leading international guidelines for treating and rehabilitating post-stroke patients, including those affected by aphasia. In particular, this theoretical overview compares the current Bulgarian guidelines with those developed in the United States of America, Europe, Australia, Canada, and New Zealand. The special emphasis is placed on the comparisons regarding speech and language rehabilitation.

Method

Methodologically speaking, the evidence was collected using information retrieval through electronic searches in the Web of Science research database for stroke and aphasia sources, including, predominantly, systematic reviews, meta-analyses, and published guidelines. Writing specifically about speech-language pathology, Orlikoff et al. (2015, p. 10), described empirical practice as a "decision-making process that integrates external scientific evidence with practitioner expertise and client perspectives to improve clinical outcomes." The issue of selecting an appropriate evidence-based aphasia assessment and treatment methodology is the challenge especially for clinical speech and language studies in Bulgaria. Similarly to other healthcare specialities, the variability between the individuals with stroke and aphasia makes it impossible for the process of selecting an appropriate research methodology to be straightforward.

Moreover, the authors were using document and content analyses of selected guidelines and articles. Such theoretical analyses of selected guidelines are providing us with comprehensive understanding of current empirical recommendations for clinicians working in the hospital setting.

For the purposes of this article, the authors compared seven published guidelines for the assessment and treatment of post-stroke aphasia:

- Australian *Clinical Guidelines for Stroke Management* (National Stroke Foundation, 2019),
- Canadian Stroke Best Practice Recommendations (Hebert et al., 2016),
- Guidelines for adult stroke rehabilitation and recovery: A guideline for healthcare professionals from the American Heart Association/American Stroke Association (Winstein et al., 2016),
- UK National Clinical Guidelines for Stroke (Royal College of Physicians, 2016),
- New Zealand Clinical Guidelines for Stroke Management (Stroke Foundation of New Zealand and New Zealand Guidelines Group, 2010),
- Guidelines for Management of Ischemic Stroke and Transient Ischemic Attack (European Stroke Organisation (ESO, 2008),
- Bulgarian National Guideline for Prevention, Diagnostics and Treatment of Cerebrovascular Diseases (Миланов, Стаменова & Касо, 2018).

The authors outlined the following seven criteria for this comparison. Six of them are related to the practices in speech and language therapy:

1. Pharmacological and non-pharmacological intervention for stroke rehabilitation;
2. Recommendation for speech-language pathology management options;
3. Computer-based treatment;
4. Aphasia screening/assessment tests;

5. Recommendations for exact frequency, intensity, timing, format or duration of treatment;

6. Language therapy focusing on production and/or comprehension of words, sentences and discourse, and conversational treatment;

7. Education and training for volunteers, caregivers and other healthcare workers.

Results

A brief description of the content of the selected guidelines is presented in Table 1.

Table 1. Comparison of leading guidelines of the USA, Australia, New Zealand, Canada, UK and Bulgaria on the inclusion of specified criteria for comparison

Criteria for comparison	USA	Australia	New Zealand	Canada	UK	Bulgaria
1. Pharmacological and non--pharmacological intervention for stroke rehabilitation	Yes	Yes	Yes	Yes	Yes	Yes
2. Recommended Speech--Language Therapy for individuals with stroke-induced aphasia	Yes	Yes	Yes	Yes	Yes	Yes
3. Computer-based treatment	Yes	Yes	No	Yes	Yes	No
4. Recommendations for exact frequency, intensity, timing, format or duration of treatment	No	No	No	Yes	Yes	No
5. Aphasia screening tests / assessment	Yes	Yes	No	Yes	Yes	No
6. Language therapy focusing on production and/or comprehension of words, sentences and discourse, and conversational treatment	Yes	Yes	No	Yes	Yes	No
7. Education and training for volunteers, caregivers and other healthcare workers	No	Yes	Yes	Yes	Yes	No

Source: Own study.

All guidelines included in the Table 1 are based on meta-analyses. In case of Bulgaria, the following approaches were included: meta-analyses on stroke

treatment (level of evidence A), nonrandomized clinical trials (level of evidence B), expert opinion and therapy standards (level of evidence C) (Миланов, Стаменова & Касо, 2018, p. 2). Table 1 indicates that, in the guidelines published in Bulgary, speech- and language therapy aimed at the individuals with stroke-induced aphasia is included; yet there are no specifically recommended aphasia screening tests (criteria 5) nor specific language therapy that addresses production and/or comprehension of words, sentences, and discourse, not to mention conversational treatment (criteria 6). For this reason, 90 meta-analysis articles on post-stroke aphasia were retrieved from the Web of Science research database containing stroke and aphasia sources to compare Bulgarian and international experience regarding speech and language assessment and therapeutic tools for aphasia. The long-term goal is to identify the appropriate aphasia screening tests and to recommend particular tools to be used with Bulgarian patients in order to make it possible to report initial outcomes for the next revision of the Bulgarian national guidelines.

According to the Bulgarian guidelines, "speech and language rehabilitation" is provided dominantly through either out-patient care in specialized speech therapy facilities or medical/rehabilitative in-patient care. The severity and nature of the aphasia largely determine the choice of speech and language intervention and the course of therapy. This may entail: (i) classic treatment with an emphasis placed on the deficit levels; (ii) functionally-oriented rehabilitation; or (iii) specialised neurolinguistic therapy (Миланов & Стаменова, 2020).

The review of the meta-analyses suggests that in Bulgaria there is no intensive phonomotor treatment of reading described by Brookshire, Conway, Pompon, Oelke & Kendall (2014) or intensive language treatment (Poeck et al., 1989; Hinckley, 2002; Kurland et al., 2016). The need to inform the patient and his or her relatives about the nature of the condition is mentioned, but more specific recommendations are needed regarding the means making the messages appropriate for a patient with aphasia. In Bulgarian clinical practice, there are still no officially implemented methods that would be well described in meta-analytic articles:

- computer-based therapy (Cherney, Halper, Holland & Cole, 2008);
- crain stimulation (Cherney, 2008; Galletta, Conner, Vogel-Eyny & Marangolo, 2016; Cotelli et al., 2020);
- semantic feature analysis as a functional therapeutic tool (Boyle & Coello, 1995; Lowell, Beeson & Holland, 1995; Boyle, 2004; Davis & Thomson Stanton, 2005; Edmonds & Kiran, 2006; Kiran & Johnson, 2008; Rider, Wright, Marshall & Page, 2008; Wambaugh, Mauszycki, Cameron, Wright & Nessler, 2013; DeLong, Nessler, Wright & Wambaugh, 2015; Wilssens, Vandenborre, Van Dun, Verhoeven, Visch-Brink & Marien, 2015; Gravier et al., 2018; Efstratiadou, Papathanasiou, Holland, Archonti & Hilari, 2018; Kendall, Moldestad, Aleen, Torrence & Nadeau, 2019);

- bilingual aphasia patients (Kiran, Sandberg, Gray, Asceso & Kester, 2013; Lorenzen & Murray, 2008).

Discussion

Australian Clinical Guidelines for Stroke Management (National Stroke Foundation, 2019) emphasise the importance of initiating aphasia therapy early, that is, as soon as the patient is stabilised following the stroke. It is stated that no harm has been associated with speech and language therapy, and, therefore, such a therapy is highly recommended for post-stroke patients affected by aphasia. It is important to identify patients with aphasia among those with stroke through screening testing and evaluation. If a stroke patient is diagnosed with aphasia, the role of the clinician is to document this diagnosis, assesst aphasia, and explain the nature of the communication disorder to the patient and his or her significant others. It is important for the clinician, the patient, and the patient's family to discuss treatment strategies and establish meaningful goals together. Moreover, it is necessary to re-evaluate the patient's aphasia at appropriate intervals of time and, when necessary, to use alternative methods of communication, such as drawing, writing, use of gestures, and facial expressions, various technical aids, and electronic applications. Intensive aphasia therapy (at least 45 minutes of direct language therapy for five days a week) and brain stimulation are rarely recommended. The way in which information is provided about the patient's health, the nature of aphasia, and the means of social support (provided by both national and regional institutions), are better when consistently and appropriately applied to the patients with aphasia (National Stroke Foundation, 2019).

According to *Canadian Stroke Best Practice Recommendations* (Hebert et al., 2016), it is important not only to screen all patients for aphasia and other speech-language disorders following the stroke, but also to make this assessment using simple, easily applicable, reliable, and validated clinical tools. Internationally recognised tests are usually employed for this purpose, which make the results appropriate for tracking changes over time. The speech-language pathologist has an important role to fulfil in the assessment of various communication areas, including comprehension, speaking, reading, writing, gesturing, use of technology, pragmatics (e.g., social cues, turntaking, body language), and conversation. There is a need for the early assessment of patients with aphasia and the provision of intensive language and communication therapy according to the individually identified needs and goals, taking the severity of impairment into account. The therapy aims at increasing functional communication and might include focus-

ing on different language processes, such as production and comprehension of words and sentences, and oral and written conversation (i.e., reading and writing, respectively). The use of various therapeutic strategies is recommended, just as the inclusion of technology: tablets, computers, and electronic mobile devices. Again, the individualisation of the needs and goals of therapy has to be emphasised, which often dictates the selection of therapeutic approaches and the intensity of the therapy (Hebert et al., 2016).

In the United Kingdom, *National Clinical Guideline for Stroke* (Royal College of Physicians, 2016) provides recommendations for the diagnosis of post-stroke communication disorders, the interaction between specialists and the patient/relatives, the identification of individual needs and the therapeutic strategy within an interdisciplinary team, and the essential role of the speech and language clinician in these processes. It is pointed out that speech-language therapy and the use a communication partner is appropriate during the first months following the stroke with a frequency that the patient successfully tolerates (Taylor-Goh, 2005). At the later stage, patients continue their therapy to intensify their participation in various communication and social activities. Having achieved this purpose, therapy may include the participation of an assistant or volunteer, a family member or a special communication partner, computer-based therapy, and the use of specialised electronic devices or impairment-based therapy. Importantly, the patient who has had a stroke, but also the caregivers, members of the patient's family, health and social care staff should be informed and trained by the speech-language therapist, which improves the quality of care, the patient's communication skills, optimises rehabilitation process, and affirms the patient's autonomy and social participation. It is emphasised that people with permanent communication disorders can be directed to participate in specialised national or regional groups for people with aphasia (Royal College of Physicians, 2016).

According to the recommendations of *New Zealand Clinical Guidelines for Stroke Management* (Stroke Foundation of New Zealand and New Zealand Guidelines Group, 2010), all post-stroke patients should be screened for communication disorders. For this purpose, necessarily reliable and valid instruments that are generally accepted are used. The patients with suspected communication impairment are referred for specialised assessment of their language and communication skills by a speech-language pathologist (SLP). This assessment can be complemented by the neuropsychological screening of cognitive skills, which enriches the identification of individual therapeutic needs and goals. The use of communication support techniques, such as the use of gestures, computer programs, and electronic devices is proposed. The emphasis is placed on an individualised approach based on the specificity of the communication disability. Long-term group therapy is recommended for patients with chronic and prolonged aphasia. Attention is also paid to the early psycho-emotional monitoring in these cases, most likely to

detect affective mental disorders that may accompany chronic aphasia and other permanent damage after the stroke (Stroke Foundation of New Zealand and New Zealand Guidelines Group, 2010).

Guidelines for Adult Stroke Rehabilitation and Recovery: A Guideline for Healthcare Professionals from the American Heart Association/American Stroke Association (Winstein et al., 2016) recommend conducting speech and language therapy for patients after the stroke, but do not specify the intensity, duration, time, and distribution of therapy sessions. This leaves the possibility for individualisation of the therapeutic program, which will make it optimally suitable and useful for each patient with specified features of his or her disability. There are discussions regarding such therapeutic approaches as, training with a communication partner, computer-based therapy, and group therapy, which may supplement the SLP's treatment. Although brain stimulation is mentioned in the context of experimental therapy, it is not recommended for routine use; however, this approach is likely to be tested in the future clinical trials to determine its efficacy (Winstein et al., 2016).

Recently, *Bulgarian National Guideline for Prevention, Diagnostics and Treatment of Cerebrovascular Diseases* (Миланов, Стаменова & Касо, 2018) has been aligned largely with the *Guidelines for the Management of Ischaemic Stroke and Transient Ischaemic Attack* (European Stroke Organisation, 2008), which provides recommendations for the prevention, diagnosis, treatment, and rehabilitation of patients suffering from acute and chronic stroke. Specifically, it recommends that the patients be cared for by multidisciplinary teams soon after the stroke within hospital stroke centers, and continuation of services for all patients with post-stroke aphasia for one year following the discharge. In addition to speech and language therapy, cognitive therapy may be provided by a clinical psychologist or neuropsychologist (Миланов, Стаменова & Касо, 2018). From a comparative point of view, it is important to note that in the U.S., medical speech-language pathology often employs the following steps using many of the listed clinical tools (Hinckley & Bartels-Tobin, 2007, pp. 57–59):

- The differential diagnosis of aphasia:
  – Boston Diagnostic Aphasia Examination (Goodglass, Kaplan & Barresi, 2000),
  – Western Aphasia Battery (Kertesz, 1982),
  – Aphasia Diagnostic Profiles (Helm-Estabrooks, 1992),
  – Minnesota Test for the Differential Diagnosis of Aphasia (Schuell, 1965),
  – Examining for Aphasia (Eisenson, 1994),
  – Bedside Evaluation and Screening Test of Aphasia (Fitch-West & Sands, 1987),
  – Aphasia Language Performance Scales (Keenan & Brassell, 1975),
  – Sklar Aphasia Scale (Sklar, 1983).

- Intervention planning in aphasia:
  - Psycholinguistic Assessment of Language Processing in Aphasia (PALPA; Kay, Lesser & Coltheart, 1992),
  - Revised Token Test (McNeil & Prescott, 1978),
  - Boston Diagnostic Aphasia Examination (Goodglass, Kaplan & Weintraub, 1983),
  - Boston Assessment of Severe Aphasia (Helm-Estabrooks, Ramsberger, Morgan & Nicholas, 1989),
  - Discourse Comprehension Test (Brookshire & Nicolas, 1993),
  - Raven Colored Progressive Matrices (Raven, 1976),
  - Cognitive-Linguistic Quick Test (Helm-Estabrooks, 2001).
- Functional communication assessment in aphasia:
  - Communication Abilities in Daily Living (Holland, Frattali & Fromm, 1999),
  - Communication Effectiveness Index (Lomas et al., 1989),
  - Discourse Abilities Profile (Terrell & Ripich, 1989),
  - ASHA Functional Assessment of Communication Skills (FACS; Frattali,
  - Thompson, Holland, Wohl & Ferketic, 1995),
  - Discourse Comprehension Test (Brookshire & Nicholas, 1993),
  - Pragmatic protocol (Prutting & Kirchner, 1983),
  - Quantitative Production Analysis (Saffran, Berndt & Schwartz, 1989),
  - Correct Information Unit Analysis (Brookshire & Nicholas, 1993),
  - Content Unit Analysis (Craig et al., 1993; Yorkston & Beukelman, 1980).

In 1995, the Bulgarian neuropsychology research team from Medical University at Sofia translated Boston Diagnostic Aphasia Examination Test of Goodglass and Kaplan, 1983, into Bulgarian and adapted it (Александрова, Терзиева, Търнев & Мавлов, 1995). After conducting the content analysis of the 90 meta-analytic articles, the Montreal Cognitive Assessment in Patients with Stroke (MoCA), a sensitive cognitive screening test (Nasreddine et al., 2005), and the Bedside Evaluation Screening test (BEST-2) were translated from English to Bulgarian and are currently being studied in the Neurology Division of University Hospital "St. Anna" in Sofia, Bulgaria. However, as there are no recommendations for the duration, frequency, and intensity of therapeutic sessions, it has been difficult to standardise therapeutic approaches. However, the lack of standardisation has made it possible for substantial individualization of the therapeutic program to take place. The need to inform the patient and his or her relatives about the nature of the condition is mentioned, but more specific recommendations are needed with regard to how to make information optimally appropriate for a patient with aphasia. There are also no guidelines regarding the role of computer-based therapy, group therapy, the use of electronic devices, or brain stimulation.

According to the American, Australian, and New Zealand guidelines (Centre for Clinical Research Excellence in Aphasia Rehabilitation, 2014), the communica-

tion-partner training should be included in the treatment of the individuals with stroke-induced aphasia and should address environmental barriers of individuals with aphasia. In the British, Bulgarian, and Canadian guidelines, there are no recommendations regarding communication-partner training. Computer-based treatment is recommended by the American, Australian, Canadian, and British guidelines as a supplement to speech and language treatment or to enhance the benefits of other therapies. There are no recommendations regarding the frequency, intensity, timing, format, or duration of treatment. Only the Canadian guidelines address the impact of aphasia on functional activities, noting that it should be assessed as appropriate from early post-onset and over time for those chronically affected. According to the British guidelines, all stroke patients, within 4 hours of hospital admission, should be assessed for capacity to understand and follow instructions, and for the ability to communicate needs and wishes.

Intensive treatment and group treatment may be warranted for the individuals with stroke-induced aphasia if they are able to tolerate it and may include a range of approaches, including the help of volunteers or caregivers guided by an SLP, computer-based programs, or other functional treatments, as outlined in many of the guidelines. According to the Canadian guidelines, the individuals with stroke-induced aphasia should receive group treatment to supplement the intensity of therapy during rehabilitation and/or continued post-discharge treatment. The Language Screening Test (LAST) and the ScreeLing seem to have the best diagnostic properties among aphasia screening tests according to the American guidelines. Each post-stroke individual should be screened for aphasia with an instrument that is sensitive, valid, and reliable. The individuals with suspected aphasia should be referred to an SLP for a comprehensive assessment. All patients with communication difficulties should receive an initial diagnosis by an SLP to determine appropriate recommendations for treatment according to the Australian, Canadian, and British guidelines. There are no similar recommendations in either the Bulgarian or New Zealand guidelines. Language therapy focusing on production and/or comprehension of words, sentences, and discourse, and conversational treatment, is recommended by American, Australian, Canadian, and British guidelines. Education and training for volunteers, caregivers, and other healthcare workers are recommended according to the Australian, Canadian, New Zealand, and British guidelines. Stroke rehabilitation units and services should involve a multidisciplinary team comprised of a speech-language pathologist and other professionals specialised in the stroke and neurological rehabilitation. Information for individuals with aphasia and their families is recommended only according to the Australian guidelines. Individuals with aphasia and their families should be provided with information about stroke and aphasia. The clinician should help the person with aphasia and his or her family understand the links between assessment results and the choice of therapy tasks and goals.

Conclusions

The Bulgarian guidelines for the prevention, diagnosis, and treatment of cerebro-vascular diseases strongly recommends a pharmacological approach in accordance with the international standards. Unfortunately, there are no recommendations for assessing the patient's quality of life. Special attention is paid to the application of evidence-based speech and language therapy, using valid and reliable instruments for the assessment and treatment of individuals with stroke-induced aphasia. The accuracy of aphasia diagnostic procedures has important implications in the stroke care in Bulgaria. Internationally, a wide range of different language tests are currently used in the post-stroke cases in different countries (e.g. Vogel et al., 2010). It is important to consider the future application of such instruments combining structuralist, functionalist, and social approaches to the assessment goals and treatment planning in accordance with ICF standards. The new systematic reviews that address the role of the right hemisphere in the recovery of stroke-related aphasia, and language and speech markers of primary progressive aphasia are publicly available and need to be disseminated and implemented by the professionals (Cocquyt, DeLey, Santens, Van Borsel & De Letter, 2017; Stalpaert et al., 2020).

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