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REVIEW ARTICLE

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Intensive Comprehensive Aphasia Programmes: a systematic scoping review and analysis using the TIDieR checklist for reporting interventions

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ABSTRACT

Purpose: Aphasia is an acquired language disorder that typically occurs as a result of a stroke. People with aphasia experience communication difficulties and risk secondary impacts, for example, affecting social and work life and mental health. Intensive Comprehensive Aphasia Programmes (ICAPs) aims to address the multiple consequences of aphasia using intensive intervention and a wide range of therapy approaches. Although basic parameters of ICAP intervention have been defined, a fuller characterisation is needed. This systematic scoping review aimed to determine what constitutes an ICAP.

Methods: Peer-reviewed and Grey databases were searched for articles on ICAPs using Joanna Brigg's Institute methodology. Data was extracted following the Template for Intervention Description and Replication (TIDieR) checklist for reporting interventions and synthesised using a narrative synthesis.

Results and conclusions: 17 ICAPs were reported in 20 peer-reviewed literature sources (9 ICAPs supplemented by Grey literature sources). There were high degrees of variation in dose, professionals involved, and no qualitative data from participants. Of note, ICAP intervention was highly tailored to individual participants on the same ICAP, and intervention content varied between ICAPs. ICAPs appear to be rationalised as intensive impairment-based programmes with other components added for comprehensiveness. Stronger rationale and a logic model are required to justify the core components of ICAPs. The input of stakeholders into designing future ICAP interventions is recommended.

➤ IMPLICATIONS FOR REHABILITATION

- The ICAP model is in its infancy when it comes to mainstream clinical application as only the intensity component of the ICAP has clear theoretical underpinning as reported in the peer-reviewed literature.
- There have been clinical uptakes of the ICAP model which is likely to continue and is valid in the context of an under-researched area of aphasia therapy and on a background of a less than perfect relationship between evidence base and practice.
- Aspects of the ICAP model are valid for clinicians to implement, for example, intensive evidence-based aphasia therapy in combination with therapy which addresses some of the broader implications of aphasia, for example, social isolation.
- Clinicians can use the ICAP model to review their existing service provision and explore whether their service provides aphasia therapy that addresses the multiple aspects of aphasia (i.e., ensuring the focus is not only on impairment-based therapy).

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Introduction

Aphasia is an acquired language disorder that typically occurs as a result of a stroke [1]. Approximately a third of stroke survivors experience aphasia [2]. There are 350 000 people in the United Kingdom (UK) [3] and approximately one million in the United States of America (USA) [4] living with aphasia. A Cochrane review [5] demonstrated the effectiveness of speech and language therapy (SLT) for people with aphasia (PWA). It found that higher intensity interventions deliver greater treatment effects. This mirrors research on higher intensity interventions from other areas of stroke, for example, for upper limb movement [6]. Evidence for intensive therapy comes largely from studies aiming to remediate language impairment [7–11].

International best practice guidelines for aphasia from nine English-speaking healthcare settings recommend intensive intervention [12] but a definition of intensive is not always provided. Australian [13], New Zealand [14], and Scottish guidelines [15] suggest a minimum of 2 h a week and the American Heart Association recommends communication intervention be as intensive as a patient can tolerate [16]. Though intensive intervention is almost universally advocated in aphasia, 2019 clinical practice guidelines from The USA "Department of Veterans Affairs and the

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Supplemental data for this article can be accessed here.

Department of Defense" state there is insufficient evidence to recommend intensive language therapy [17]. UK sources provide the most specific data on recommended intensity and accompany this with regular audits of the suggested target. UK stroke guidelines recommend at least 45 min of therapy per day per profession post-stroke [18], that is, 45 min of SLT for those with communication and/or swallowing disorders. Annual national audits of UK stroke practice show that patients receive far below this recommended intensity, particularly with respect to SLT [19]. The most recent UK national audit (April 2018 to March 2019) showed after the first 72 h, teams provided a mean of 20.9 min of SLT daily to those who required it [20]. It is not evident how many of these minutes were spent on communication intervention versus swallowing, the latter being a key priority for stroke inpatients requiring SLT [21] and internationally noted to be prioritised over communication in the acute setting [22,23]. International provision for PWA in developed countries is an average of 1–5 h a week depending on service type, for example, private versus public, inpatient versus outpatient, and stage of recovery [24]. Survey data from five healthcare systems in English-speaking countries revealed the duration of therapy from 1–20 sessions for acute patients and a reported wide variation for those in the chronic stage [25]. Recent data shows the duration of total therapy lasts no more than three months for 94% of PWA in the UK [26]. Early Supported Discharge (ESD) services aim to maintain intensive provision, but stroke professionals have not reached a consensus on its intensity or length [27]. Once ESD ends, support for PWA and their families/significant others is highly variable and not formalized.

Aside from the question of intensive therapy, there is a query regarding what type of therapy to provide to PWA. As aphasia presents as difficulty in the language and communication modalities (speaking, understanding, reading, writing, and gesture), an obvious need is in relation to language and communication. Therapy should target recovery of language processing abilities as far as possible across all modalities (e.g., speaking and reading) [28]. There are many types of aphasia therapy that have proven to be effective, but typically these therapies address only one element of aphasia, for example, word-finding difficulties [29], discourse [30], or gesture [31]. Though Speech and Language Therapists (SLTs) provide a wide range of therapy approaches [23] a recent study of usual aphasia care in Australia found 57% of therapy tasks focused on expression at the single word level [32]. There are few studies that report on long-term aphasia outcomes, but it is clear from those that do that recovery of language is almost always partial [33–36] and therefore compensatory communication skills are also required [37]. The World Health Organisation's International Classification of Functioning, Disability, and Health (ICF) [38] classifies health by domains of "body functions," "activities," "participation," and "environment." Each needs to be addressed in a comprehensive and holistic intervention programme. For example, impairment therapy will attempt to remediate loss of body function (impaired language processing), while the development of communication strategies, education, and communication partner training might address activity, participation, and environmental issues.

PWA have hugely complex and comprehensive needs in relation to social and psychological wellbeing. A study of PWA at a mean of 3.5 years post-stroke revealed 30% could not indicate a single friend [39], highlighting the importance of communication in maintaining social networks. A qualitative analysis of blogs written by PWA show negative and substantial impact on the wider social network including neighbours and co-workers [40]. Studies show return to work figures ranging from 15% [41] to 23% [42] for working-age PWA compared to figures of 74.7% [43] for the equivalent general stroke population. This indicates the importance of wider aspects of language, for example, the ability to read and write in order to sustain work. Mental health is impacted and PWA experiences significantly higher rates of depression than the wider population of stroke survivors [44]. Rates of significant anxiety in PWA have been measured at 41–44% [45] compared with rates of 29% for the wider stroke population [46]. A study exploring the impact of 60 diseases and 15 conditions on over 66 000 long-term care residents found that aphasia was associated with the worst health-related quality of life [47]. The experience of stroke survivors with aphasia differs from stroke survivors without, and the presence of aphasia creates additional and complex challenges which should be addressed in a comprehensive intervention programme.

The effects of aphasia are experienced not only by PWA, but by those in close relationships with them, and a comprehensive intervention programme should consider their needs too. Significant others have expressed a need for information about aphasia, support for themselves, and a desire for inclusion in the rehabilitation process [48]. Marital difficulties may present including lower levels of marital satisfaction and sexual intimacy [49]. A study of family members of PWA found they experienced third-party disabilities including development or exacerbation of physical and mental health conditions, reduction in household income, and limitations to their activities [50]. For these reasons, aphasia has been described as a family problem [51]. Whilst involvement of family members is encouraged in rehabilitation, this does not easily translate into roles in therapy or specific interventions for family members. One notable exception is communication partner training. This approach focuses on a core issue, communication breakdowns due to aphasia, and provides training and advice to facilitate better conversations between the PWA and a primary communication partner. Two systematic reviews synthesized findings from 56 studies and demonstrated good evidence for this approach [52,53]. However, this approach does not address the heterogenous needs of family members, which do not seem to be targeted in traditional approaches to therapy which focus more on the PWA [5].

Another consideration in rehabilitation is the format in which therapy is delivered. In the UK, 90% of SLT sessions are provided in one-to-one format [54] and group therapy approaches are underused [55]. Group therapy can be as effective as one-to-one therapy [5,56] and can achieve additional benefits arising from an authentic and naturalistic communication environment [57] and increased opportunities for socialization and friendships [58]. A further modification to therapy can be achieved through the engagement of digital technology. New technologies can supplement "conventional" therapy delivery by, for example, providing strategic compensations for language impairments [58–60]. They can also help to prevent digital exclusion in a UK context where 87% of the population uses the internet daily [61]. Systematic reviews have shown that computer-delivered aphasia therapy is effective when compared to no treatment and can match outcomes achieved by one-to-one SLT delivery [62]. Computer-delivered exercises can also bring about well-maintained gains in word production, even without input from a speech and language therapist [63]. Therefore, approaches to aphasia intervention should consider greater use of group approaches and the potential and unique benefits of computer-based interventions.

The Stroke Association 2018 survey of over 11 000 stroke survivors living in the UK showed a third needed more support from

SLT [64], that stroke survivors had to develop their own ways of coping [65], and that carers experienced an emotional toll including exhaustion and stress [66]. The survey results reveal an unmet need where PWA and their families experience ongoing difficulties which have not been addressed by current levels or models of healthcare provision.

A model of service delivery has been developed that aims to respond to the multi-factorial and unmet needs of PWA and pays some consideration for the needs of caregivers. Early evidence for this model is documented in a 1947 University of Michigan record detailing "Intensive corrective training… a daily program of therapy… application of individual and group therapy… periods of three to six hours a day in sessions of six, eight, or twelve weeks' duration" [67,p.26]. Video footage from 1950 of the same Speech Clinic at the University of Michigan shows the provision of an intensive aphasia programme primarily for World War II veterans which included a comprehensive range of therapies and both group and individual sessions [68]. This programme continues to the current day and is now termed an Intensive Comprehensive Aphasia Programme (ICAP). A seminal article by Rose et al. in 2013 [69] stipulated that to be classified as an ICAP, the programme must fulfil the following criteria: be provided to a cohort of PWA; include education for the PWA and/or significant others; target multiple components of the aphasic experience, that is, providing language therapy while also addressing the affects living with aphasia has on a person's participation, activities, and communication; be delivered in a variety of formats, for example, individual therapy and group therapy; and an ICAP must be intensive. The minimum intensity of an ICAP is measured at three hours of therapy daily for at least two weeks. Rose et al.'s international survey [69] found 12 ICAP programmes running throughout the world, mostly in the USA. The survey revealed the average treatment provided was 100 h, with most ICAP programs running 4 days a week for 5 weeks for an average cohort of six PWA.

The seminal paper by Rose and her team has begun to define the parameters and dosage of ICAP programmes. However, more specific detail about the nature of therapy and the rationales behind it is lacking. Under-reporting of treatment content is recognised as a problem across rehabilitation domains and stimulated the development of the Template for Intervention Description and Replication (TIDieR) checklist [70]. This is a 12-item checklist developed by an international expert team to improve the quality of reporting interventions and therefore the replicability of the interventions. Use of the TIDieR checklist has been recommended by two Cochrane reviews of post-stroke physical rehabilitation to adequately document interventions so that they are replicable for clinical practice [71,72]. In Randomised Controlled Trials (RCTs) of physiotherapy interventions, 23% of trials described less than half of the TIDieR checklist items for the intervention groups, meaning replicability of the interventions would be challenging [73]. A 2017 review of 162 RCTs in the field of SLT found that none completely reported TIDieR items, but when authors were contacted for additional detail, 28% fulfilled all TIDieR criteria [74]. Since this study, the TIDieR checklist has been used to categorise SLT treatment approaches in aphasia [75,76], to explore documentation of communication partner training interventions in aphasia [77], to specify treatment content in RCTs [78,79], and to review descriptions of aphasia interventions [80].

This study systematically reviewed the literature on all ICAPs that have been conducted to date against the TIDieR checklist. It aimed to describe ICAP therapies and their underlying rationales in as detailed a manner as possible, while also identifying gaps in the research. A preliminary search of databases revealed no existing scoping or systematic reviews of the ICAP literature.

Review question(s)

The primary review question was "What constitutes an ICAP"? The review aimed to identify ICAPs around the world reported in the English language. The 12 questions on the TIDieR checklist framed the sub-questions for this review.

Inclusion criteria

Participants

This review included studies of participants with any type or severity of chronic (non-progressive) aphasia. Aphasia could be due to any aetiology acquired in adulthood. Significant others/caregivers of PWA were included with no criteria for their presentation. Exclusion criteria: Studies were excluded if they reported on participants with progressive neurological disorders, such as primary progressive aphasia. Studies involving participants with primary cognitive-communication impairments, rather than aphasia, were also excluded.

Concept

This review considered studies of intervention that fell within the definition of an ICAP provided by Rose et al. [69]. This included interventions that were not explicitly titled as ICAPs or which occurred before this term was developed. Based on the Rose et al. article, the first core concept of an ICAP is intensive service provision – daily therapy (meaning therapy 5 days a week (2019 personal correspondence with Rose), given for at least 3 h/day for 2 weeks. Where therapy was not 5 days a week but 30 h a fortnight was still achieved, the source was included. This decision is consistent with that of Rose et al. [69].

The second core concept is comprehensive service provision – delivery in a mixture of formats which must include 1:1 and group, addressing multiple levels of the ICF [38], and provision of education to participants and/or caregivers. Finally, an ICAP must be delivered to a cohort – there is a requirement for participants to start and end the programme at the same time.

Therefore, studies were included if they

a. Provided intensive aphasia therapy (using the metric outlined above)
b. Delivered therapy in 1:1 and group format.
c. Therapy addressed multiple levels of the ICF.
d. Education was provided on the programme (see "Stakeholder Involvement" and "Modification" for more detail)
e. The cohort was evident.

Exclusion criteria: cognitive-communication rehabilitation programmes which self-identified as different from ICAPs [81–84].

Context

This review considered studies from all geographical locations and settings (e.g., hospital, community, independent sector).

Types of articles

This scoping review considered quantitative, qualitative, and mixed methods study designs and studies that involved primary research, either prospective or retrospective. Grey literature articles were kept "open," that is, not restricted to article types. Only articles published in English were considered due to the cost implications of translation and the limits of the research team.

Regarding the date, the term ICAP was only introduced in the peer-reviewed literature in 2013 but there was older evidence of ICAP-type programmes. Therefore, articles published from database inception to the review date were included to maximize the identification of articles.

Methods

Searches were conducted between 11 December 2019 and 18 December 2019. The scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews [85]. This methodology requires at least two reviewers, an *a priori* protocol to be written, detail on participants, concept, and context (as seen before), use of a three-step search strategy (outlined next), thorough searching of both peer-reviewed and Grey literature, and data extraction or "charting" of results. In this review, there were some minor deviations from the JBI protocol: specifically, duplicate study selection and data extraction/charting was not conducted due to limited author resource (see specific detail under "study selection"). The protocol was developed before the review commenced and is included as a supplemental file. The Grey literature search followed three stages outlined by Godin [86] (expanded upon next).

Search strategy

A three-step search strategy was used. Step one involved an initial search of MEDLINE to identify articles on the topic. The text words contained in the titles and abstracts of relevant articles, and the subject or index terms used to describe the articles were used to develop a full search strategy for MEDLINE. Step two involved running the full search including all identified keywords and index terms in a range of databases (Supplementary Appendix 1). Index terms were adapted for each included database as necessary. Step three involved searching the reference lists of articles included in the review for additional articles. The search strategy underwent a Peer Review of Electronic Search Strategies [87] by the university subject librarian.

Information articles

The Grey literature search involved (1) Grey databases, (2) Customised Google search using keyword strategy as per Fridell et al. [88] using the key words "intensive comprehensive aphasia" and reviewing the first 100 results in the English language as per Pham et al. [89], and (3) Grey websites searched using internal search engines (Supplementary Appendix 2).

Study selection

The search was run by the first author, and all identified records were collated and uploaded to RefWorks (ProQuest, MI, USA). Due to resource limitations, the second and third authors made independent inclusion/exclusion decisions on 10% of abstracts each, and the first author made inclusion/exclusion decisions on the remaining abstracts. To ensure a level of rigor, the second and third authors each reviewed the first author's inclusion/exclusion decisions on 10 results. The first author brought any unclear inclusion/exclusion decisions to the attention of the second and third authors and decisions were discussed three ways and resolved with a consensus decision. The same procedures applied for the full-text selection. Study selection was outlined using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) checklist [90], see Figure 1.

Stakeholder involvement

The JBI methodology does not require stakeholder involvement, but original guidance on conducting scoping reviews by Arksey and O'Malley [91] and Levac et al. [92] from which JBI methodology was derived suggested consultation with stakeholders become an essential part of the methodology. Stakeholder involvement was also included as part of good practice in patient public involvement [93]. Two family members of PWA who had attended ICAPs were consulted for their views on the core concepts of an ICAP and the research questions. They were sent the scoping review plan and questions in advance. A videoconference call was held with each family member individually whereby they endorsed the review questions, queried the concept of "education" in an ICAP (see "Modification" under "Results"), and added additional questions which were not suitable for this literature review but will be included in future research on the ICAP model.

Data extraction

All data extraction was conducted by the first author. The data extraction tool was trialled independently on separate articles by the first and third authors and jointly discussed. The remaining data extraction was conducted by the first author and verified by the third author as is permissible within JBI scoping review methodology [85]. The data extraction tool is provided in Supplementary Appendix 3, developed by the research team. Authors of articles were contacted to request missing or additional data were required to confirm the article met inclusion criteria. Website information from the Grey website and Google search was extracted and charted on an Excel spreadsheet as per Stansfield et al.'s [94] method on systematic website searching.

Narrative synthesis

The seminal article on scoping reviews by Arksey and O'Malley [91] suggested that a scoping review did not seek to aggregate or synthesize knowledge from articles. However, the more recent PRISMA-ScR guidelines [90] list "synthesis of results" as a best practice guideline. JBI guidance suggests a narrative summary describing how information from articles relates to the questions posed in the review and classifying this information using conceptual categories [85]. Narrative synthesis has been used to interpret information from a variety of study types and guidance for narrative synthesis was obtained from several articles [95–97]. The synthesis was structured according to the 12 TIDieR checklist items (see Table 1), as has been the practice in previous reviews in the field of aphasia [32,77].

Methods for selecting items for analysis

Following JBI methods for a comprehensive scoping search, Grey literature was searched. Following data extraction and identification of ICAP programmes, a problem arose whereby several ICAPs had more than one related peer-reviewed article. For the purpose of reporting information against the TIDieR checklist, it was possible to choose one primary article each for most ICAPs, but four ICAPs (Aphasia House [98,99], Boston [100–102], Aphasia Language Impairment and Functional Therapy (LIFT) [103–105],

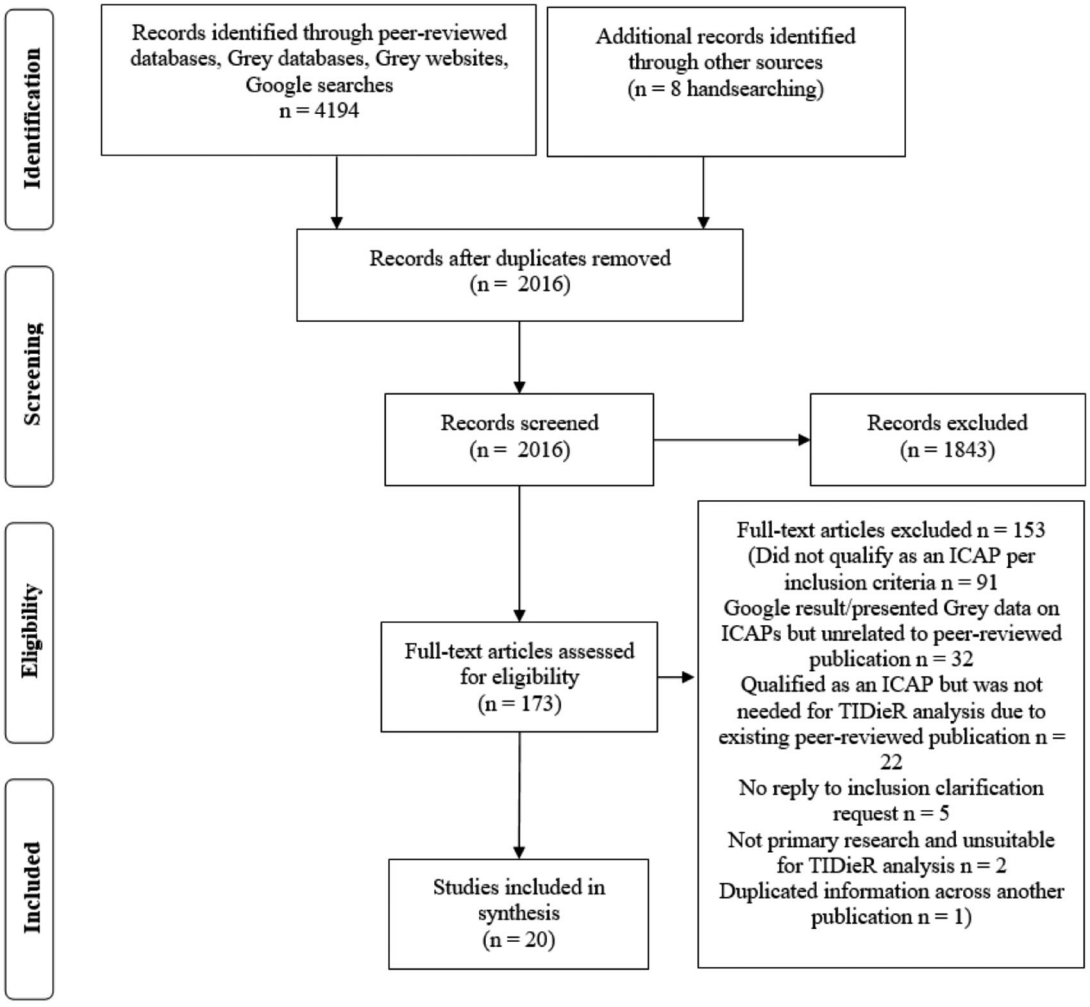

Figure 1. PRISMA flow diagram.

Table 1. TIDieR item reporting.

TIDieR item	Number of ICAPs reporting this item ($n = 17$)
1. Brief name	17
2. Why	17
3. What materials	12
4. What procedures	17
5. Who provided	15
6. How	17
7. Where	Country = 17 Setting = 16
8. When and how much	17
9. Tailoring	12
10. Modification	2
11. How well planned	3
12. How well actual	8

and University of Michigan Aphasia Program (UMAP) [106,107]) required more than one article each to adequately extract all the information – see Tables 2–4. There was a possibility that some ICAPs with multiple articles over many years had experienced small changes to their delivery and that selecting one article would not capture these changes. However, this concern was not substantiated by the data reported, and personal correspondence with authors confirmed that the basic premise of the ICAP intervention remained standard and at the same dose during the years covered by the articles. The only exception was the LIFT ICAP [103–105] where dose changed significantly for each iteration (40 h versus 48 h versus 100 h), as did the content (with the addition of computer therapy after the first iteration) and could not reasonably be reported as the same ICAP. Therefore, the LIFT programme was considered as three iterations of the ICAP and allocated a name indicating each iteration of the programme (LIFT1, LIFT2, LIFT3).

Results

Modification

One modification of the inclusion criteria was required. Initial data extraction revealed that it was not always clear from articles whether "education" was provided to PWA or their significant others as is required to qualify as an ICAP [69]. The clinical experience of the three authors suggested that some therapy approaches could not be achieved without a level of education being provided. Additionally, the family members consulted for this review felt the term education was patronising and did not recognise expertise they had accumulated by the time they attended ICAP years post-stroke. Since education as a term was deemed both broad and underspecified, and interpretation of the term was liable to subjectivity, it was dropped from the concept inclusion criteria.

Twenty peer-reviewed publications were included in this review (Figure 1) and report on 17 distinct ICAPs which comprise

Table 2. Name, rationale, and materials used in the 17 ICAPs.

#	ICAP	Article	1. Brief name	2. Why	3. What materials
1	Aphasia House	Helm-Estabrooks and Whiteside 2012 [98]	The Aphasia House (Florida, US). Using life interests and values cards to select goals for an ICAP	Not ICAP-specific. Personalised goal setting can improve motivation, response to rehab, satisfaction with outcomes, increases autonomy but you must make this accessible for people with aphasia. Theory on intensive treatment. You must explore non-impairment issues (e.g., life interests and values via these accessible cards).	Life interests and values cards for goal setting depicting activities for adults, feelings/ emotions, adaptations (e.g., adaptive equipment) etc. Assistive technology, articles of interest
		Whiteside and Pak Hin Kong 2013 [99]	Aphasia House ICAP	Not ICAP-specific but theory on intensive treatment, need for supportive environment, and evidence-based therapies for impairment approaches.	Life interests and values cards, assistive technology integrated also
2	Belfast	Code et al. 2010 [109]	Intensive therapy for 7 with chronic aphasia	Not ICAP-specific. To examine the effectiveness of a 1-month intensive block of therapy in improving the communication abilities of the aphasic participants. Also rationale on group treatment.	NR
3	Big Sky Montana	Off et al. 2019 [111]	Big Sky Aphasia Program ICAP (Montana, US). Caregiver intervention on an ICAP provided by SLPs and counselling staff.	ICAP theory – to improve communication impairments and psychosocial wellbeing for people with aphasia and their family caregivers. Treat all aspects of World Health Organisation International Classification of Functioning, Disability and Health (ICF) in condensed time period. Theory on intensity (e.g., neuroplasticity). Meaningful relationships between people with aphasia and significant others. Caregiver intervention affecting the caregiver-patient dyad to improve outcomes for people with aphasia and caregiver. Interprofessional collaboration important. Cohort brings share learning, share psychosocial experiences, quick bonding, shared focus, collectivism.	Caregiver materials: Your Guide to Aphasia: Recovery, Treatment & Resources Handbook available: https://comdde.usu.edu/services/research/language-and-aphasia/2_aphasia_online_handbook.pdf; Powerpoint notes; handout that differentiates aphasia symptoms from apraxia of speech symptoms; Caregiver Bill of Rights; video. For PWA: access to an adapted gym; mobility supports (e.g., wheelchair); access to adaptive recreational equipment (e.g., adaptive bikes), home program
4	Boston	Hoover et al. 2017 [100]	An Intensive Comprehensive Aphasia Program at Boston University	ICAP rationale combining evidence on intensive treatment; acknowledging the difficulty identifying key elements of change in an ICAP due to variety of participant profiles and individualised interventions; speculation that key factors include intensity, individualised treatment linked to person's goals, using evidence-based treatment, combining group, dyadic, individual treatment, focus at multi linguistic levels from word to discourse, including communication partners, and interdisciplinary treatment.	iPad2
		Hoover and Carney 2014 [101]	An Intensive Comprehensive Aphasia Program at Boston University	No overview but indicated that treatment philosophy is the Life Participation Approach to Aphasia, so it's focused on individual goals and meaningful activities chosen by clients. Also key is training across linguistic contexts – 1:1 – group.	Apps and iPad. Clinician resources available at www.bu.edu/aphasicenter [first author couldn't locate but found some at http://www.bu.edu/aphasiacenter/current-programs/resources-for-arc-groups/].
		Escher et al. 2018 [102]	An Intensive Comprehensive Aphasia Program at Boston University	Not ICAP-specific. Effectiveness of OT intervention within an ICAP to address improving IADLs etc.	Adapted recipes (photos and large print), otherwise implied within goals e.g., using video calling technology

(*continued*)

Table 2. Continued.

#	ICAP	Article	1. Brief name	2. Why	3. What materials
5	Chicago	Babbitt et al. 2015 [114]	0	Focuses on intensity – neuroplasticity principles and providing more therapy than in typical US outpatient facilities	Computers, iPads
6	Copenhagen	Jensen and Lonnberg 2009 [136]	Intensive rehabilitation programme for returning to work post aphasia	Not ICAP-specific. Statement that return to work may be a goal of rehabilitation.	NR
7	Glasgow	Mackenzie 1991 [115]	An intensive aphasia group efficacy study of 5 people with aphasia	Not ICAP-specific. Whether improvement in communication followed a brief course of intensive intervention. Literature on evidence for intensive treatment.	Pictures, written cue cards, TV, newspapers, clocks
8	InteRACT	Persad et al. 2013 [107] NB this article also reports on UMAP	InteRACT – Intensive Residential Aphasia Communication Therapy program (Halifax, Canada)	The overarching goal of the ICAP is to maximize communication potential and enhance life participation [p.390]. Paper is clear on ICAP model but not specific on rationale.	NR
9	iTAWC	Ferdinandi and Duke 2012 [108]	A pilot intensive comprehensive aphasia treatment for 7 PWA in British Colombia	ICAPs have received attention in the literature but they haven't been available in British Colombia	NR
10a and b	LIFT 1 and 2 Rodriguez	Rodriguez et al. 2013 [104]	LIFT – Aphasia Language Impairment and Functional Therapy (Brisbane, Australia)	Research-based ICAP developed for the purpose of evaluating treatment outcomes across the ICF domains. [p.1339]. Rationale on neuroplasticity, patient-centred goal setting, inclusion of communication partner, but acknowledge difficulty identifying which aspects of an ICAP effect change.	Accessible written information, communication book, rest linked to treatment approaches (e.g., use of pictures)
10c	LIFT 3 Dignam	Dignam et al. 2015 [103]	LIFT – Aphasia Language Impairment and Functional Therapy (Brisbane, Australia)	Rationale focused on evidence from neuroscience of intensive training versus evidence for long-term learning from distributed practice.	NR
		Dignam et al. 2016 [105]	LIFT – Aphasia Language Impairment and Functional Therapy (Brisbane, Australia)	Not ICAP-specific. This study focused on novel word learning in aphasia to inform recovery mechanisms and help predict potential for improvement.	Computer software programmes, for example, StepbyStep
11	Louisiana	Fitzgerald-DeJean et al. 2012 [113]	Use of experience sampling method with one gentleman who took part in an intensive aphasia program	Not ICAP-specific. Mostly focused on testing whether the experience sampling method works. Program was designed to promote functional communication in a relatively natural setting.	Computers, humorous videos, a device [palmOne Zire 31 PDA] to collect ESM data.
12	Milton Keynes	Brindley et al. 1989 [116]	Intensive therapy for Broca's aphasia (5 people per cohort for 2 cohorts)	Not ICAP-specific. Allocating more time to traditional treatment. Theory given for individual approaches, for example, syntax programme, effective communication programme, group sessions, word retrieval programme, verbal memory programme.	Photographs borrowed from home to use in treatment
13	Oklahoma	Prigatano et al. 1985 [135]	Neuropsychological rehabilitation after closed head injury in young adults	Not ICAP-specific. Rehab emphasizes cognitive retraining but doesn't include the emotional and motivational problems experienced. Including psychotherapeutic interventions might maximise recovery.	Non-SLP: Cognitive retraining materials and tasks
14	PIRATE	Winans-Mitrik et al. 2014 [112]	PIRATE – the Program for Intensive Residential Aphasia Treatment and Education (Pittsburg, US). Outcomes of a total of 73 first-time participants in an ICAP.	No ICAP-specific rationale. Detail on approaches, for example, groups generalise gains/enhance social participation & on psycholinguistic treatment theory, for example, PALPA	Customised resources for each participant, for example, support groups in their area. Home treatment program.
15	UMAP	Hinckley & Craig 1998 [106]	UMAP – University of Michigan Aphasia Program	Not ICAP-specific. Rationale for intensive treatment.	Computers
		Persad et al. 2013 [107] NB this article also reports on InteRACT	UMAP – University of Michigan Aphasia Program	The overarching goal of the ICAP is to maximize communication potential and enhance life participation. [p.390] Paper is clear on ICAP model but not specific on rationale.	NR

NR: not reported, that is, no information provided for TIDieR analysis.
Grey shaded rows represent the data extracted from grey literature to supplement that which available from the peer reviewed publication.

Table 3. Procedures, providers, how and where ICAPs were provided and detail on tailoring.

Article	4. What procedures	5. Who provided	6. How	7. Where	9. Tailoring
Helm-Estabrooks and Whiteside 2012 [98]	Set goals with LIV cards, provide intensive therapy that includes group approaches	NR	Group	The Aphasia House at the University of Central Florida	Individualised
Whiteside and and Pak Hin Kong 2013 [99]	4 PWA per cohort. 4 students per participant. Each student took on 1 area of impairment and devised an approach based on literature review of evidence and consultation with clinical educator.	4 graduate level student clinicians per participant (i.e., 16 students per programme) and clinical educator mentioned	1:1, group, dyadic	The Aphasia House at the University of Central Florida	Individualised
Code et al. 2010 [109]	Tx planned daily by 2 SLTs. Small groups formed based on having either mild or severe aphasia and one group for apraxia of speech (AOS). No specific detail on what therapy was provided other than it was individualised based on test results and participants with AOS received group sessions on articulation and speech practice. Counselling offered 1:1 for PWA and there were 4 counselling groups for families (1 a week) on topics of coping etc.	2 experienced SLTs familiar w participants; trained and experienced assistant (unspecified type); trained counsellor experienced in aphasia	1:1; group (of 7)	Belfast, by the charity Speech Matters	Individualised
Off et al. 2019 [111]	20–30 min opening and closing meetings each day for PWA and caregivers. For PWA. SLT: individualised comprehensive evidence-based therapy provided daily in individual and small conversation group (2–3 people) formats and weekly in a large group (4–8 people). Weekly community outings. MDT: Opportunity for physical therapy and consultation with AAC experts as needed. For caregivers: SLT weekly SSLT-led education group for education/ training/ psychosocial support (topics including the nature of aphasia, apraxia of speech, and stroke; the nature of recovery; neuroplasticity, communication strategies, tools and resources). MDT: Counsellor-led counselling groups provided twice a week (focus on personal wellness, caregiving strategies, emotional health, adaptation to significant life changes). Once a week group lunch. Once a week community outing. End of ICAP potluck social.	Certified and licenses SLPs, graduate student clinicians enrolled on the SLP program, a licensed professional counsellor and a counsellor-in-training. A caregiver who became a liaison between the caregivers and the interprofessional team.	1:1; small group (2–3); large group (4–8)	Big Sky Montana: The University clinic of the University of Montana in Missoula; counselling for caregivers provided in a separate building.	The caregiver engagement is optional.
Hoover et al. 2017 [100]	Dyadic treatment, for example, CILT, PACE. Group treatment, for example, LPPA, Toastmasters, newsletter group, language games, current events, book club, occupational therapy, physical treatment, nutrition treatment. Community-based outings weekly with caregivers. Caregiver training from all disciplines.	Licensed clinical faculty and second-year, MS-SLP graduate students at Boston University under 100% faculty supervision [p.85]. Average 8 students per program who had completed the aphasia course. All received extensive interprofessional orientation and training.	1:1; group; dyadic; computer	At Boston University	Individualised (based on their goals)
Hoover and Carney 2014 [101]	Speech-language therapy, occupational therapy, physical therapy, and nutrition treatment. Extensive detail on content of therapy, for example, specific apps and iPad	Speech-language pathology, occupational therapy, physical therapy, and nutrition	1:1; group; dyadic; computer	At Boston University	Individualised

(*continued*)

Table 3. Continued.

Article	4. What procedures	5. Who provided	6. How	7. Where	9. Tailoring
	useability features used, content and purpose of group sessions.	faculty planned, coordinated, and conducted treatment along with supervised graduate student clinicians (27).			
Escher et al. 2018 [102]	Provided OT input as part of an ICAP, delivered daily in group or individual or joint sessions with other MDT. Focus "on IADLs, leisure, social participation, and work or volunteering, and they emphasized the use of problem-solving techniques" (p. 3).	An OT and 2 OT graduate students. Interprofessional team including physical therapists, speech-language pathologists and nutritionists. University faculty from the department of occupational therapy [and the other MDT areas] along with students from each of these professional programmes.	1:1; group [for OT]	NR	Individualised (based on their goals)
Babbitt et al. 2015 [114]	10 participants per program. Individual and group treatment: reading/writing treatment, constraint-induced language treatment, computer-based treatment, conversation/ interactive group. Ideally each treatment hour focused on the same type of treatment to maximize repetitions.	Speech-language pathologists who are recruited from other positions for the program duration. They are trained in evidence-based aphasia tx. 6 treating clinicians per ICAP. 2 of these each had over 20 years of experience. Others came from a variety of settings (inpatient/outpatient/day rehab with between 2–15 years of experience in neurological communication impairments).	1:1, groups (3–5 PWA with 1–2 clinicians)	Offsite of an urban rehabilitation centre in Chicago, transient with no dedicated clinical space requiring set-up and break-down of equipment/ supplies/ materials.	Individualised
Jensen and Lonnberg 2009 [136]	Intensive language and communication training combined with social and vocational rehabilitation followed by a work trial or vocational placement.	NR	NR	Centre for Rehabilitation of Brain Injury in Copenhagen	NR
Mackenzie 1991 [115]	Individual treatment programmes on picture naming, verbal expression, and sequential picture description. Group treatments with 2 or 3 participants/ group.	The author (likely an SLT given affiliation to School of Speech Therapy) and an SLT employed 0.5 for the project. 2 additional SLTs each provided group sessions on 1 day a week (unclear if this equals one on one day and another on another day). SLT students participated in unspecified ways.	1:1; group (of 5); pairs	In a college of education [somewhere in Scotland, assuming Glasgow from author affiliation]	Everyone did group treatment but individual treatment options came from a set menu of up to 3 possible treatments – naming [4 people], verbal expression [3], and sequential description [for the 1 who didn't do naming]. Target items for naming were different for each but all targets came from items on the Picture Naming Test. Same for verbal expression treatment with targets from the Verbal Expression Test and for sequential description with targets from the

(*continued*)

Table 3. Continued.

Article	4. What procedures	5. Who provided	6. How	7. Where	9. Tailoring
					Sequential Description Test.
Persad et al. 2013 [107] NB this article also reports on UMAP	Individual: impairment-based language and motor speech (e.g., MIT), reading/writing, for example, anagram and copy treatment; functional/ multimodal communication skills (e.g., PACE), and computer skills. Group treatment for conversation and community integration. Group recreation treatment and group physical therapy.	NR	1:1, group, computer	InteRACT at Dalhousie University	NR
Ferdinandi and Duke 2012 [108]	Individual treatment including constraint-induced language therapy, use of technology, group treatment, and an adapted book club	9 SLPs from Colombia Speech and Language Services Inc. with 7 graduate speech students.	1:1; group	iTAWC: Assumed Vancouver from author affiliation but not detail on setting	NR
Rodriguez et al. 2013 [104]	2 ICAPs ran, LIFT 1 giving treatment to $n = 4$ PWA; LIFT 2 gave treatment to $n = 7$. Treatment included impairment-based approaches such as SFA, phonological components analysis, modified mapping treatment, mind-mapping for narrative, AOS treatment, etc. Functional approaches included context-specific tasks and compensatory or strategical approaches. Group therapy provided education about aphasia and social interaction. There were family group sessions and computer-based treatment only for LIFT2.	The goal planning interview … was facilitated by LIFT clinicians and researchers experienced in goal-setting [p. 1345] For every four participants, two full-time clinicians, and two full-time student volunteers were required [p. 1347]	1:1; Group for LIFT1. 1:1; Group; family group; computer for LIFT2	LIFT: University of Queensland [given in Dignam et al., 2015]	Individualised (to level of language breakdown and individual goals)
Dignam et al. 2015 [103]	3 intensive and 8 distributed ICAPs were run and the groups pooled. $n = 16$ LIFT and $n = 18$ D-LIFT (who don't qualify for ICAP intensity). Impairment treatment focused on word-retrieval using SFA/phonological component analysis. Computer treatment for same. Functional treatment for individual communication goals. Group therapy for education on aphasia, communication strategies, and support.	Qualified speech pathologists who received training on the treatment approaches used. Sometimes computer tx led by speech pathology students or a trained allied health assistant supervised by a qualified speech pathologist.	Group; Computer [Individual not mentioned but Rodriguez procedures referenced so assumed it involves 1:1 too]	LIFT: University of Queensland and in rehabilitation centres in Brisbane and Sydney	Functional treatment tailored to individuals' goals
Dignam et al. 2016 [105]	This paper reports on 30 PWA, 29 of whom are the same as in the Dignam 2015 paper and received the same treatment as described in Dignam 2015. Participants in this paper also completed a novel word learning activity, but this was not part of the therapy (was in Assessment).	As above – qualified speech pathologist who were trained in Aphasia LIFT; computer tx facilitate by student or training AH assistant under supervision.	Group; Computer; [doesn't explicitly say individual therapy was provided but this is assumed from individualised treatment sets for naming tx]	LIFT: [Author affiliations all Brisbane and paper references Dignam 2015]	Naming treatment targets for each participant selected from 309 picture stimuli from BOSS (bank of standardised stimuli) – 24 the participant couldn't name and 6 they could name were included in their treatment sessions.
Fitzgerald-DeJean et al. 2012 [113]	Daily treatment including computer lab, pantomime/improvisation and music appreciation, community reintegration, wellness group. Tai chi happened 3 times a week for the first 3 weeks and was replaced by watching humorous videos.	A certified SLP and student clinicians (SLP) for SLP activities. Graduate students in psychology for psychological support. Clinical instructor in kinesiology to administer modified Tai Chi.	1:1; small group; entire group (of 6)	University based. Assume Louisiana as all authors based there.	NR

(*continued*)

Table 3. Continued.

Article	4. What procedures	5. Who provided	6. How	7. Where	9. Tailoring
	Psychological support group for carers. Weekly socials and some community-based field trips.				
Brindley et al. 1989 [116]	Visit all participants at home pre- treatment to gather info for treatment data, all completed a 1:1 syntax and group effective communication programme, then optional extras delivered depending on profile, for example, word retrieval, articulation, attention and STM. Unclear of time allocated to each component. All but one went home at the weekend.	SLTs. Volunteer assisted in the group sessions.	1:1; Group (of 5)	Milton Keynes hospital. Residential. Hospital accommodation.	Everyone in syntax programme 1:1 and everyone in effective communication groups. 8/10 had 1 of 3 additional programme options and 2/8 had 2 of 3 additional programme options (from word retrieval, articulation, verbal memory).
Prigatano et al. 1985 [135]	Individual and group treatment focusing on increased awareness and acceptance of brain injury, intensive cognitive retraining of deficits, developing compensatory skills. Relatives met weekly for support and help to generalise.	3 clinical neuropsychologists, 1 speech and language pathologist, 1 occupational therapist and part-time physical therapists. A research psychologist helps develop various cognitive retraining materials and tasks. A consultant psychiatrist meets with the staff monthly to discuss the management of various patients.	1:1, small groups	Presbyterian Hospital Oklahoma City	NR
Winans-Mitrik et al. 2014 [112]	Treatment planning meeting to establish goals. Individual treatment: cognitive-linguistic aphasia therapy (e.g., SFA, VNEST, TUF, phono-motor treatment, spelling treatment); weekly social and therapeutic group activities (e.g., ordering food in a restaurant). Weekly client and caregiver [when available] education in a group. Home treatment program.	Licensed SLPs experienced in aphasia	1:1; Groups (3 people per cohort)	PIRATE: VA Pittsburgh Healthcare System (VAPHS). Residential. Only for community-dwelling veterans and active duty military personnel.	Individualised
Hinckley & Craig 1998 [106]	Individual, group and computer lab treatments provided. Therapy was individualised including role-playing, community outings, naming.	Certified SLPs	1:1; Small group; Computer lab	UMAP: University of Michigan	Individualised treatment. Also, Groups 1–3 got different therapy intensities during the non-intensive periods.
Persad et al. 2013 [107] NB this article also reports on InteRACT	Tailored treatment including evidence-based interventions. Caregivers encouraged to attend. Additional weekly social and recreational activities provided. Weekly music and art therapy. [Music and art is the only bit not mentioned in Hinckley & Craig 1998]	NR	1:1; Group; Computer based	University of Michigan Aphasia Program (UMAP)	Individualised

NR: not reported, that is, no information provided for TIDieR analysis.
Grey shading signifies grey literature reports.

Table 4. Modifications and adherence and fidelity on ICAPs.

Article	10. Modifications	11. How well planned	12 How well actual
Off et al. 2019 [111]	Counselling has only been included in the Summer ICAP sessions [not Fall]. No specific reason given.	NR	Although attendance is not mandatory, the majority of caregivers have attended on a regular basis.
Hoover et al. 2017 [100]	NR	Saying students received 100% supervision and daily training to ensure treatment fidelity	NR
Hoover and Carney 2014 [101]	No change of intervention but change of outcome measure (ALA with cohort 1 and ASHA FACS with cohorts 2 and 3)	NR	NR
Escher et al. 2018 [102]	Variation in amount of OT delivered "from year to year was based on individual and cohort needs and goals" (p. 3)	NR	18 of 19 attended at least 85% of the occupational therapy sessions. 1 had considerable health problems and missed a full week of the program.
Babbitt et al. 2015 [114]	NR	Steps to ensure treatment fidelity: Clinicians required to read articles on evidenced based treatment 2-day training session including videos of experienced clinicians implementing the treatment and practice through role-play; program director observed occasional treatment sessions and gave feedback on treatment procedures. 10% of treatment sessions were videoed and reviewed by the program director.	Summary statement that the strategies ensured treatment was delivered according to the design. Of 74 most participants attended all treatment – occasional missed sessions due to outside appointments. 1 person missed 2 days with illness.
Mackenzie 1991 [115]	NR	NR	No patient was absent on any day
Rodriguez et al. 2013 [104]	Dosage increased in LIFT2 "based on performance on outcome measures and participant feedback" (p. 1343). Added the family group sessions and computer-based treatment only for LIFT2.	Number of treatment hours received by each participant was calculated.	Of 8 enrolled in LIFT2, 1 didn't complete due to onset of prolonged cold/flu. Of total possible treatment hours 7 received 99–100%; 2 received 90–95%; 2 received 85–89%. Sessions missed due to outside obligations, illness, fatigue in the last week.
Dignam et al. 2015 [103]	NR	Aphasia LIFT manual developed to promote treatment fidelity.	All 16 completed LIFT. Mean treatment attendance rate was high LIFT = 47.7 h. D-LIFT not reported as didn't reach ICAP intensity but attendance at D-LIFT 47.9 and 16/18 completed D-LIFT due to acute-onset medical reasons
Dignam et al. 2016 [105]	NR	NR	There were 30 included in this trial and 28 completed. 2 D-LIFT participants withdrew due to acute-onset medical reasons.
Fitzgerald-DeJean et al. 2012 [113]	NR	0 for the intervention but participant compliance in completing the Experience Sampling 4 times a day for each of 4 questions asked	0 for the intervention, but 100% compliance/completion 464 potential responses [4 variables × 4 times/day × 29 days]
Winans-Mitrik et al. 2014 [112]	NR	NR	3 did not complete the programme (1 was query acute stroke, 1 personal reasons, 1 unsafe for independent living due to multiple falls)
Hinckley & Craig 1998 [106]	NR	0. No detail on fidelity during intensive periods. But tried to ensure non-intensive therapy contained the same content as intensive – did this via a retrospective progress note review and reading reports describing treatment. Attendance at non-intensive sessions confirmed by oral/written communication with treating SLP.	0. But adherence to a similar treatment approach for the non-intensive treatment was confirmed.

NR: not reported, that is, no information provided for TIDieR analysis.
Grey shading signifies grey literature reports.
Seven ICAPs did not report any data for TIDieR items 10, 11 and 12 and were thus not included above: Aphasia House, Belfast, Copenhagen, InteRACT, iTAWC, Milton Keynes, Oklahoma, and UMAP.

14 ICAPs and three iterations of LIFT (LIFT1, LIFT2, LIFT3) (Supplementary Appendix 4); nine of these 17 ICAPs were additionally reported in the grey literature. A further 14 ICAPs were identified in the Grey literature reports (see Supplemental File), with 11 based in the USA and one each in the UK, Canada, and Spain. Nine were based in private healthcare settings, four in University clinics, and one in a public healthcare setting (UK). Much information was missing in the Grey literature reports, meaning it was not possible to complete the TIDieR analyses for these ICAPs. As such, the analysis focused on the ICAPs reported in peer-reviewed publications.

Table 1 reports the number of studies that include information under each TIDieR item, even if the extent of that information is very limited or insufficient for study replication.

Narrative synthesis of results

Brief name – provide the name or a phrase that describes the intervention

All articles described the intervention but only eight provided an official ICAP name in the peer-reviewed article, for example, Aphasia House [98]. A Google search identified one additional official name for an ICAP "Intensive Treatment for Aphasia in Western Canada" (iTAWC) that was not provided by the peer-reviewed article [108]. ICAPs without official names were allocated a name based on the location of the ICAP, for example, "Belfast" [109], and names were organised alphabetically, see Table 2.

Why – describe any rationale, theory, or goal of the elements essential to the intervention

Though some form of the rationale was provided for all studies, most articles did not provide a specific or complete rationale for the ICAP service delivery approach (Table 2). Most articles drew on evidence for intensive treatment in aphasia, for example, from the Cochrane review [5], the meta-analysis of outcomes in aphasia [7], or more general principles of neuroplasticity to justify intensive approaches [110]. Articles with a greater focus on the "intensive" aspect detailed how the ICAP model offered an opportunity for increased intensity of aphasia therapy provision.

Although all included articles qualified or self-identified as ICAPs, only a minority gave specific rationale for the ICAP approach that went beyond the focus on intensity. In other words, rationales for comprehensive therapy and the need for or importance of each ICAP element (e.g., the cohort) were less clear. Two articles highlighted the need to address multiple levels of the ICF in the LIFT1&2 and Big Sky Montana ICAPs [104,111]. Another included a focus on multiple linguistic levels (e.g., from word to sentence) as a goal of the Boston ICAP [100]. General evidence that group therapy was effective was provided by some articles (Boston, Belfast) [100,109] or a more specific focus on groups for the purpose of generalising skills (PIRATE) [112].

A minority of articles provided specific rationales for caregiver intervention (LIFT1&2, Big Sky Montana) [104,111]. Only one article hypothesized about the rationale for involving a cohort, suggesting a cohort was necessary for shared learning, shared psychosocial experiences, quick bonding, and a shared focus (Big Sky Montana) [111].

Some articles in this review focused on a specific aspect of an ICAP and their rationale naturally linked to that aspect, for example, focus on intensive versus distributed treatment provision in LIFT3 [103], use of an experience sampling method in Louisiana [113], the importance of personalized goal-setting in Aphasia House [98], or the rationale for specific evidence-based therapies in PIRATE [112].

What (materials)

Though 12 ICAPs provided some detail on materials, this detail was as basic as reporting the use of pictures, newspapers, communication books, or computers (Table 2). This level of detail does not allow for replicability of the intervention. The articles did not transparently or explicitly list resources used, however, Boston and Big Sky Montana ICAPs [100,111] provided links to clinician resources available online, and some listed specific software and hardware requirements. During data extraction, it was evident that materials used by clinicians would have been linked to the therapies provided, even if those materials were not described. A common unspecified but implied example would be the use of picture resources for picture naming therapy.

What (procedures) – describe each of the procedures, activities, and/or processes used in the intervention, including any enabling or support activities

Nine ICAPs had a pure speech and language therapy focus – Aphasia House, LIFT1,2,3, iTAWC, PIRATE, Chicago, Glasgow, and Milton Keynes [98,103–105,108,112,114–116]. For ease of reporting the term "speech and language therapy" (SLT) will be used throughout this review, even when other equivalent professional titles are used in the source paper. Across ICAPs, there was a wide variety of SLT activities described including role-playing, pantomime, improvisation, community outings, the inclusion of caregivers, and social and recreational opportunities outside of ICAP time (Table 3). Some ICAPs listed specific impairment-based approaches such as semantic feature analysis [117], phonological components analysis [118], modified mapping therapy [119,120], mind-mapping for narrative work [121], constraint-induced language therapy [122], Treatment of Underlying Forms [123], phono-motor treatment [124], Verb Network Strengthening Treatment (VNeST) [125], reading and writing interventions [126], and provision of therapy for apraxia of speech [127]. Functional approaches mentioned included: compensatory or strategic approaches, context-specific tasks [128], and Promoting Aphasics Communicative Effectiveness (PACE) [129]. Group therapy included education about aphasia, opportunity for social interaction, support, a life participation approach to aphasia [130], newsletter group/current events group/book club [131]/Toastmasters (public speaking), language games, and music appreciation. Computer therapy varied between studies. LIFT3 and Chicago ICAPs [103,114] used software with an evidence base for PWA, both using the same conversational scripting software [132], Chicago using oral reading software [133], and LIFT2 using word retrieval software [134]. The later LIFT3 documented that the primary purpose of computer therapy was to focus on word retrieval which mirrored the focus of impairment-based therapy sessions [105]. The InteRACT ICAP focused on computer skills generally including emails and internet use [107]. Two other ICAPs mentioned computer labs where the focus was unspecified (Louisiana) [113] or unclear (e.g., a mix of semi-independent practice and communication skills) (UMAP) [106]. Cognitive retraining (Oklahoma) [135] or work on short-term memory were also mentioned (Milton Keynes) [116]. Most ICAPs indicated an impairment-based focus with the addition of other therapy approaches (e.g., functional therapy) to achieve comprehensiveness.

The remaining eight ICAPs involved SLTs and other professionals. Although the involvement of others was noted and is detailed under TIDieR item 5, it was less common to detail the

specific procedures and activities enacted by other professionals. The student SLT role was detailed in three articles. In Aphasia House, four students were allocated to each participant with each student responsible for one area of the client's "impairment." Students reviewed literature, developed, and delivered a therapy programme to address the impairment [99]. In Boston, students delivered therapy under "100% supervision" [100,p.85], and in LIFT3 students led computer sessions [103]. An article by Escher et al. centred on Occupational Therapy work on the Boston ICAP including a focus "on IADLs [instrumental activities of daily living], leisure, social participation, and work or volunteering" [102,p.3]. Other ICAPs provided basic details on the involvement of other professionals as follows: counsellors provided counselling both for carers and people with aphasia and an informally recruited carer liaison helped to facilitate some of the caregiving sessions in Big Sky Montana [111]; researchers of unknown clinical background were described as running goal-setting sessions in LIFT1&2 [104]; a research psychologist developed cognitive retraining materials and tasks in Oklahoma [135]; a volunteer assisted with group sessions in Milton Keynes [116]; psychology students provided support to carers and a kinesiologist delivered tai chi sessions in Louisiana [113]; a clinical neuropsychologist delivered the intervention in Oklahoma [135]. As will be highlighted under TIDieR item 5, some ICAPs reported on different therapy approaches but did not provide detail on either procedures or providers.

Who provided – for each category of intervention provider (such as a psychologist, nursing assistant), describe their expertise, background, and any specific training given

All but two ICAPs – InteRACT and Copenhagen [107,136] – explicitly reported that SLTs provided therapy but SLT involvement can be assumed for 100% of ICAPs as articles detailed speech and language interventions and both Grey literature and personal correspondence with authors indicated SLTs provided the intervention (Table 3). Three articles from the USA reporting on ICAPs Boston, Big Sky Montana, PIRATE [100,111,112] noted that SLTs were certified or licensed by the professional body. Expertise was only detailed by a minority of articles, noting clinicians were "experienced in goal-setting" (LIFT1&2) [104,p.1345], experienced in aphasia (PIRATE) [112], or received training on the therapy approaches used (LIFT3) [103]. Babbitt et al. [114] noted SLTs were recruited to the Chicago ICAP from a variety of aphasia settings with a range of 2–20 years of experience with this client group.

Other providers were involved, see Figure 2. Student SLTs were the next most common grouping, providing intervention on nine ICAPs – Aphasia House, Boston, LIFT1,2,3, iTAWC, Big Sky Montana, Louisiana, Glasgow [99,100,103–105,108,111,113,115]. Researchers of unknown clinical backgrounds were involved in LIFT1 and LIFT2 [104] and a research psychologist in the Oklahoma ICAP [135]. Assistants were part of the LIFT3 and Belfast ICAPs [103,109] and a volunteer in the Milton Keynes ICAP [116]. Leaving SLTs, student SLTs, researchers, assistants, and volunteers aside, there were eight ICAPs that could be considered multi-disciplinary through the involvement of other named professionals or assumed involvement of others, namely Boston, InteRACT, UMAP, Belfast, Big Sky Montana, Louisiana, Oklahoma and Copenhagen [100,107,109,111,113,135,136]. Of the eight, there were three programmes (Copenhagen, InteRACT, and UMAP) where other multidisciplinary team (MDT) members were likely to have contributed but are not explicitly named. The Copenhagen ICAP provided social and vocational rehabilitation and linked work trials or vocational placement which likely required MDT input, but this was not clear from the abstract [136]. It is not clear whether other professionals or SLTs provided both the recreational and physical therapy on InteRACT or the art and music therapy provided on UMAP [107]. Though the Big Sky Montana ICAP was clearly multidisciplinary as evidenced shortly, it also mentioned opportunities for physical therapy and Augmentative and Alternative Communication consultations, but not who provided these opportunities [111]. In Boston and Oklahoma ICAPs, both occupational therapists and physiotherapists took part [100,135] and Belfast and Big Sky Montana ICAPs involved counsellors [109,111]. Thereafter, other professionals were named each taking part in just one ICAP – nutritional faculty and graduate students of nutrition, occupational therapy, and physiotherapy – Boston [100]; psychology students and a kinesiologist – Louisiana [113]; a counselling student and an informally recruited a carer liaison – Big Sky Montana [111]; and a clinical neuropsychologist – Oklahoma [135].

The range of professionals involved varied from only SLT involvement [106,112,114] to a total of five different professionals involved in Oklahoma [135]. The Boston ICAP seemed to involve the greatest total number of multidisciplinary professionals by including clinically qualified faculty staff from occupational

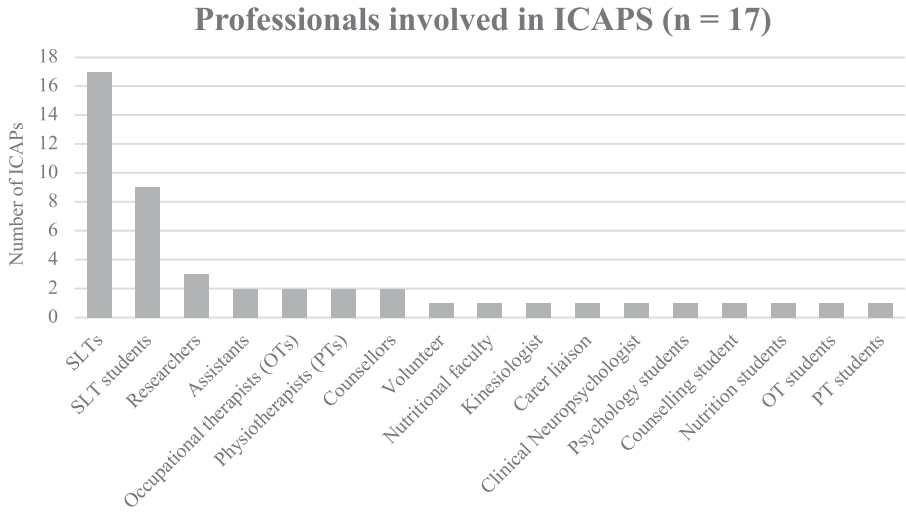

Figure 2. Professionals involved in ICAPs.

therapy, physical therapy, nutrition therapy, SLT, and graduate students from these four areas [100].

It seems in the literature that some ICAPs have moved from an SLT-only focus to a more multidisciplinary ICAP. For example, articles linked to UMAP which seems to be the oldest ICAP in existence [67,68] show an evolution from pure SLT focus [106] to a mention of music and art therapy in later iterations [107].

How – describe the modes of delivery (such as face to face or by some other mechanism, such as internet or telephone) of the intervention and whether it was provided individually or in a group

All ICAPs were delivered face to face (Table 3). Individual sessions were explicitly listed by 15 ICAPs (exceptions LIFT3 and Copenhagen [103,136]) and group sessions explicitly listed by 16 ICAPs (exception [136]) but individual and group sessions were confirmed via personal correspondence as per inclusion criteria. Some ICAPs provided an indication of group size – either what they called "small" groups with no further indication of size [106,113,135] or small groups of 2–3 in Big Sky Montana [111]. Intervention on these ICAPs was also delivered in larger groups of six (Louisiana) [113] or 4–8 participants [111]. Dyads in Aphasia House and Boston [99,100] and pairs in Glasgow [115] were mentioned. Computer labs (assumed to be in group format) or sessions or technology use were mentioned for eight ICAPs including LIFT2 but not LIFT1 [100,103,104,107,108,113,114].

Sometimes staffing ratio was documented but only for SLTs or SLT students to clients. From highest to lowest, staffing levels started at four student SLTs per participant (Aphasia House) [99]; seven SLTs and nine student SLTs for seven clients (iTAWC) [108]; an average of eight second-year graduate Master of Science SLT students for cohorts of 6–8 clients (Boston) [100]; "two full-time clinicians, and two full-time student volunteers" for every 4 clients (LIFT1&2) [104,p.1347], six full-time SLTs per ICAP with 10 participants and 1–2 clinicians for groups of 3–5 PWA (Chicago) [114]; just under a total of two SLTs for five participants (Glasgow) [115]; and two SLTs for 7 clients (Belfast) [109].

Where – describe the type(s) of location(s) where the intervention occurred, including any necessary infrastructure or relevant features

The country of origin was known for all ICAPs (see Figure 3 and Table 3): eight in the USA [98,100,106,111–114,135]; three in the UK [109,115,116]; two in Canada [107,108]; one in Australia which ran the three versions of LIFT [103–105]; and one in Denmark [136]. The setting of the ICAP was known for all (see Figure 4) with one exception (iTAWC) [108]). Eight were University-based, counting LIFT1 and LIFT2 separately [98,100,104,106,107,111,113]; five were in healthcare settings [112,114,116,135,136]; LIFT3 ran at multiple sites split across University and healthcare settings [103]; Belfast was in a charity setting [109]; and Glasgow was in a college of education [115]. Most articles did not report on infrastructure, but some provided a basic idea of what might be required starting with Babbitt et al. [114] who reported their Chicago-based ICAP did not have dedicated clinical space and therefore required set-up and break-down of all associated materials for each ICAP on an unnamed location off-site of a major urban rehabilitation centre. The PIRATE ICAP [112] provided via the USA Veteran's Association Healthcare System and the Milton Keynes ICAP [116] were both residential – that is, accommodation was provided to participants. In the Big Sky Montana ICAP [111], counselling for caregivers was provided in a separate building. The ICAP detailed in Helm-Estabrooks and Whiteside [98] was

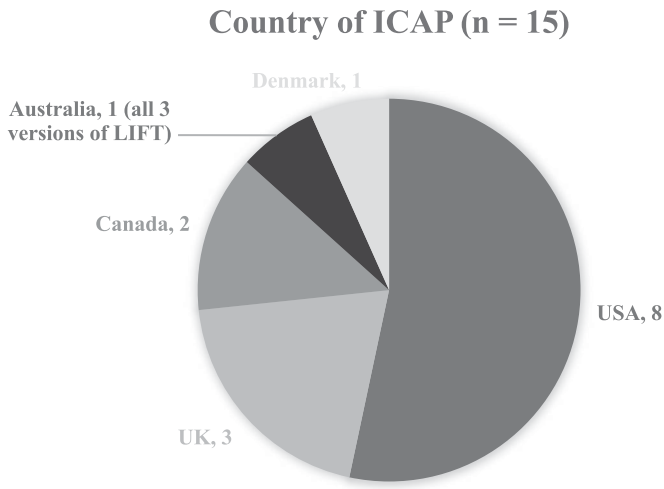

Figure 3. Country of ICAP origin.

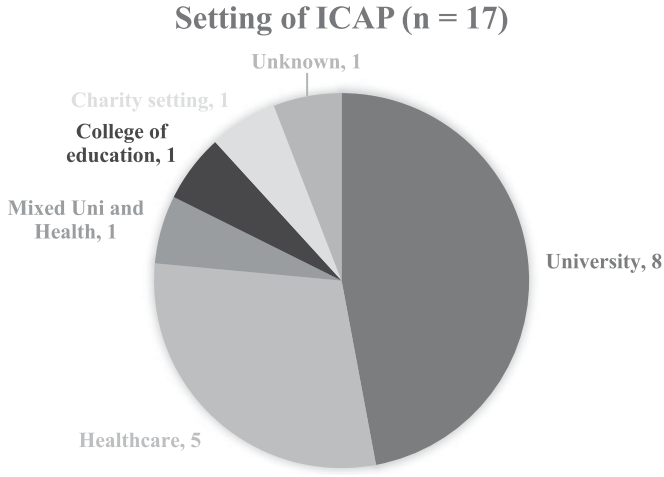

Figure 4. Setting of ICAP.

provided in a purpose-built aphasia-friendly clinic "The Aphasia House" on a University campus. It was not clear if other University-based ICAPs were delivered via an on-site clinic or otherwise.

When and how much – describe the number of times the intervention was delivered and over what period of time including the number of sessions, their schedule, and their duration, intensity, or dose

The lack of systematic reporting made it difficult to compare the intensity of ICAP intervention. The most-reported item was *length* in *weeks* or *months*. This was explicit in the reports of 16 ICAPs and easily inferred for the 17th ICAP, PIRATE [112] who reported on 23 days of ICAP with therapy every day which would indicate a duration of 4.5 weeks. Therefore, the range of length of ICAP in weeks was 2–26 weeks. The most common duration of an ICAP (the mode) was four weeks with five ICAP iterations running for four weeks (Boston, LIFT2, Belfast, Chicago, Oklahoma) [100,104,109,114,115] and Big Sky Montana running for either four or five weeks [111] (see Figure 5). The other LIFT ICAPs were shorter – 2 weeks (LIFT1) and 3 weeks (LIFT3). For those of longer length, InteRACT and UMAP ran for 4.5 weeks [107,112], iTAWC for 5 weeks [108], Aphasia House, UMAP and Louisiana for 6 weeks [98,106,113], Milton Keynes for 12 weeks [116], Copenhagen for 16

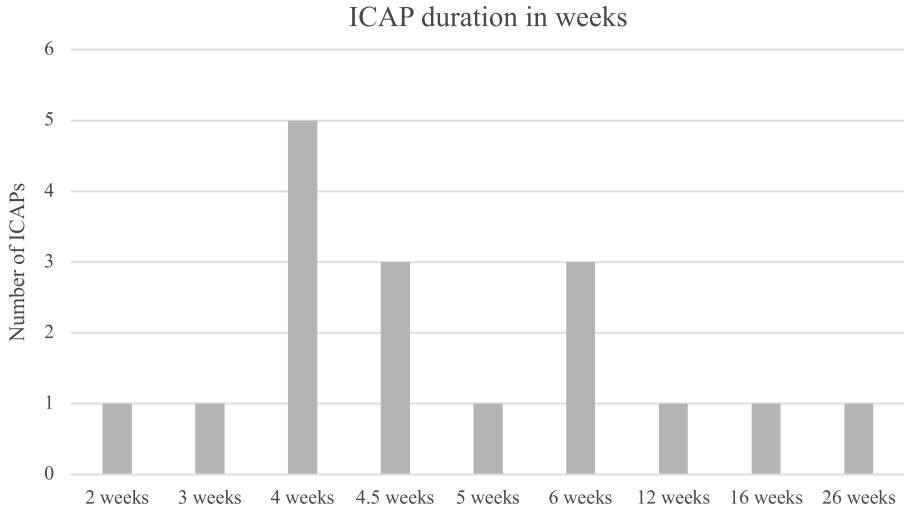

Figure 5. Duration of ICAP in weeks .

[136], and Oklahoma for 26 weeks [135]. Days per week were only reported for six iterations; hours per day reported for five; hours per week for five; total days for two; and overall total hours reported for six ICAPs. The range in overall total hours reported was 40–120. It is likely some ICAPs provided greater overall hours, for example, on the 6-month ICAP, but this could not be calculated without knowing when breaks were taken, etc. Information provided was sufficient to confirm that all 17 ICAPs were delivered at least at the minimum standards of ICAP intensity as per Rose et al. [69] and this was confirmed via personal correspondence with authors where required.

As highlighted above, reporting of treatment intensity varied greatly (see Supplemental File for detail), and additional challenges were noted. One issue arising was the separation of assessment and therapy hours. Babbitt et al. (Chicago ICAP) [114] was the only article specifying that of the total hours, six were for assessment. It is possible some articles may have separated assessment out of total hours and only reported on total therapy hours. There was a secondary issue calculating therapy hours where articles reported hours of attendance at the ICAP. It is assumed the participants were not constantly engaged in therapy for the entirety of the day without any breaks and it is not clear how this calculation was managed in some reports. Sometimes there was an issue calculating therapy hours when other professionals were involved, for example, on InteRACT [107] or in Boston [102] where it was unclear how hours were counted for joint sessions across professions. The Big Sky Montana ICAP [111] indicated a tendency to increase their hours over time, for example, from 36 h over three weeks in 2014 (which would not reach current standards of ICAP intensity [69]) to 72 h over four weeks in 2017. Others decreased hours (e.g., LIFT2 was 100 h over four weeks [104], LIFT3 was 48 h over three weeks [103]). Though caregivers were deemed a desirable part of an ICAP, most articles did not report on caregiver hours – see Big Sky Montana [111] as an exception.

Tailoring – if the intervention was planned to be personalised, titrated or adapted, then describe what, why, when, and how

Hoffmann et al. state "In tailored interventions, not all participants receive an identical intervention" [70,p.7]. Examples provided in the TIDieR checklist detail interventions being tailored depending on participants' body mass index or response to a health questionnaire. In relation to ICAPs, tailoring was not based on specified pre-determined criteria. However, each PWA would have presented with different types of aphasia, different goals, and different co-morbidities, and these factors seem to have been amongst the driving forces for individualised interventions (Table 3). On some ICAPs, words to practise in therapy were selected based on a participant's performance on naming tests in LIFT3 and Glasgow ICAPs [105,115]. Another example was that participation-based goals (e.g., ordering a meal or booking a holiday) differed among participants and necessitated individualised intervention plans to achieve these goals. Detail on tailoring was provided for 12 ICAPs and this detail was "individualised therapy" for nine of these ICAPs. The other types of tailoring mentioned were that therapy was given from a limited menu of options – for example, word retrieval, articulation, verbal memory (Glasgow, Milton Keynes) [115,116], or that caregiver engagement was optional (Big Sky Montana) [111]. Though not explicitly mentioned in all articles, most ICAP interventions seemed to be personalised to the participant. Hoover et al. [100] provided appendix examples of personalised therapy for every participant on the Boston ICAP. To exemplify, participant D4 used software to support their severely impaired output alongside therapy using melody and rhythm, scripted conversations, and an approach focusing on verbs in sentences. Participant A5 seemed to have milder aphasia and engaged in entirely different therapies including phonological components analysis and narrative treatment. Although all participants were partaking in an ICAP, the definition of which appears to define what therapy is received, each participant seemed to be receiving an individualised programme of therapy. It was unclear from the data to what degree the personalisation of intervention changed the ICAP content from person to person.

Modifications – if the intervention was modified during the course of the study, describe the changes (what, why, when, and how)

There was no detail on modification within studies (Table 4). Two ICAPs mentioned modifications between studies. Dosage was increased from LIFT1 to LIFT2 "based on performance on outcome measures and participant feedback" [104,p.1343]. The feedback was not detailed, nor was the issue with the outcome measures. The counselling aspect of the Big Sky Montana ICAP was only included in Summer sessions (not Autumn/Fall sessions), but a reason for this modification was not provided [111].

How well (planned) – if intervention adherence or fidelity was assessed, describe how and by whom, and if any strategies were used to maintain or improve fidelity, describe them

It was not clear if any ICAP had an a-priori plan to calculate adherence, but many reported on this characteristic (see TIDieR item 12). Three ICAPs planned or detailed strategies to ensure a level of treatment fidelity (Table 4). Babbitt et al. (Chicago) [114] took several steps to ensure therapy fidelity. Clinicians were required to read articles on evidence-based therapy; a two-day training session was provided including videos of experienced clinicians implementing the therapy and practice through role-playing; the programme director observed occasional therapy sessions and gave feedback on therapy procedures; 10% of therapy sessions were videoed and reviewed by the programme director. Dignam et al. (LIFT3) [103] created an Aphasia LIFT manual to promote treatment fidelity. Hoover et al. (Boston) [100] reported that students received 100% supervision and daily training to ensure treatment fidelity.

How well (actual) – if intervention adherence or fidelity was assessed, describe the extent to which the intervention was delivered as planned

Eight ICAPs detailed a level of adherence (Table 4). Participants on LIFT1 and LIFT2 [104] were combined to report percentages of possible therapy hours received. Seven participants received 99–100%; two received 90–95%; two received 85–89%. Reasons for missed sessions included outside obligations, illness, and fatigue which were noted particularly in the final week. On LIFT2, one of eight participants did not complete due to ill health. Dignam et al. [103] reported that all 16 completed LIFT3 with a mean therapy attendance rate of 47.7 h (of a possible 48). Escher et al. [102] reported only on the occupational therapy aspect of the Boston ICAP but detailed that 18 of 19 attended at least 85% of OT sessions. One participant had considerable health problems and missed a full week of the programme. Babbitt et al. (Chicago) [114] reported that most of the 74 participants attended all therapy sessions. They noted that occasional sessions were missed due to outside appointments. One participant missed two days due to illness – the highlighting of this incident likely reflecting high attendance rates overall. Three of 73 did not complete the PIRATE ICAP [112], one with a query of an acute stroke, one for personal reasons, and one was deemed unsafe for independent living due to multiple falls. No participants were absent on any day of the Glasgow ICAP [115]. Off et al. (Big Sky Montana) [111] provided a general statement that most caregivers attended on a regular basis. Finally, there was no concrete data given on treatment fidelity. Though Babbitt et al. (Chicago) [114] detailed several steps taken to ensure fidelity, the monitoring methods used were not reported in the article and there was no externality in fidelity checking.

Discussion

In summary, there were 17 ICAPs located in the peer-reviewed literature (some running multiple programmes) and an additional 14 identified only in the Grey literature (not reviewed here). The rationale for the ICAP service delivery model came primarily from evidence for intensive impairment-based therapy. Other core concepts of the ICAP model were not well justified. Materials were poorly reported. SLT procedures on an ICAP were better reported than the activities enacted by other involved professionals. Almost half of ICAPs was multi-disciplinary. All were delivered face to face with a combination of 1:1 and group therapy but not all ICAPs made use of computers. ICAPs were most prevalent and active in the USA and most likely to be based in a University setting. The most common duration of an ICAP was four weeks but the detail on dose was reported with wide variability and was difficult to capture. ICAPs delivered highly personalised therapy to PWA who took part. Modifications to ICAPs and data on fidelity were not reported. However, reported adherence levels were upwards of 85%.

Intensity

A primary focus on intensity was often the rationale provided for the ICAP approach and was well justified with reference to evidence for intensive therapy in aphasia [11] and the principles of neuroplasticity [110]. It is interesting that although the intensity was the main rationale provided for ICAPs, the intensity was not well defined and there were issues calculating the dose of therapy in some studies. Issues defining intensity in aphasia treatment have already been raised in the literature [137] and there is no consensus definition of dose in stroke or aphasia rehabilitation [138]. Additionally, there is interest in comparing the relative merit of intensive and distributed therapy models with some evidence that a dispersed ICAP model (i.e., where the same treatment dose is delivered over a longer period) may achieve equal outcomes [103]. Pending future research, the core concept of an ICAP being one of intensity may change to being a question about optimal dose. Notwithstanding these issues, evidence for intensive therapy is limited to impairment-based or functional communication outcomes [5] which are only one component of an ICAP. Some articles provided evidence for specific aspects of the therapy, for example, group therapy in aphasia, but there was no convincing argument for the overall ICAP approach – that is, the rationale for providing comprehensive approaches in an intensive manner or the necessity to provide these approaches as a combined service model. Intensive provision of the varying types of therapy might be equivocal [5] or perhaps theoretically contra-indicated. Treatments that address adjustment post-aphasia may require an aphasia management timeline of many years [139,140] and PWA desires life-relevant and longer-term interventions [141]. The literature provides evidence that peer-led aphasia groups [142] and more general groups providing longer-term support for PWA [143] are viewed positively by participants, but these are not intensive approaches. SLTs have positive views on intensive therapy. In interviews with seven SLTs working on ICAPs, the main theme was the intensive therapy model [144]. Clinicians reported seeing the progress they did not see in their non-ICAP services. Views of PWA and their family members on intensive therapy provision have not yet been solicited, but higher drop-outs from non-ICAP-specific intensive therapy programmes in the field of SLT may indicate that intensive therapy is not acceptable to some PWA [5]. High levels of multi-disciplinary involvement were seen on ICAPs, but the peer-reviewed literature did not always include non-SLT hours as part of reaching the minimum 30 h/fortnight standards of intensity required by ICAP programmes [69]. That some ICAPs do not count non-SLT input towards therapy intensity is problematic (see further discussion under "other aspects of comprehensiveness"). Clarification may be required on whether non-SLT approaches count towards the intensity of intervention. Finally, it may be contra-indicated to deliver certain therapy approaches in an intensive manner, so delineation of the intensive components of an ICAP is required.

Comprehensiveness

The core components of an ICAP which are said to make it comprehensive are therapy delivered in different formats including individual and group therapy; therapy targeting multiple levels of the ICF; and education provision for family/PWA [69]. These core components of comprehensiveness will be analysed in the following sections.

Delivery format

All ICAP provisions were face to face. This compares to UK SLT provision for community-dwelling stroke survivors where 99.5% of sessions were face-to-face [54]. However other countries have higher uses of telehealth in SLT including Australia and the US and a recent systematic review of tele-practice for adult populations in SLT concluded that it was an appropriate means of service delivery [145]. The Big Sky Montana ICAP announced on Twitter that due to COVID-19 it has for the first time delivered a virtual ICAP, where daily hours and days per week were reduced to manage fatigue on videoconferencing software (18 June 2020 Tweet by Dr. Cathy Off)[1]. PIRATE highlighted that they achieved higher levels of follow-up data with participants when they expanded their methods of collection to assessments delivered via tele-practice [112]. Funding is being sought to run Australia's first tele-rehabilitation ICAP [146] and there has been a shift to the provision of therapy via video-conferencing software due to the COVID-19 pandemic [147] so a move away from face to face may be the natural evolution of ICAPs. There was a huge range in the staff/student to patient ratio varying from 16 staff/students for seven participants [108] to two SLTs for seven participants [109].

Computer-based therapy

Computers or technology were only used on eight ICAPs and the interpretation of the "computer" component of an ICAP was highly variable. Specific uses of computers varied from an extension of impairment-based naming therapy, for example, increasing the practice of items rehearsed in individual sessions using software specifically designed for SLT intervention [103], to tackling social connectedness and exploring usability features of mobile tablets [101]. A potential rationale for the use of computers is the evidence of improved language [62] or compensatory skills arising from computer therapies [59,60]. However, such evidence was not cited in the ICAP literature. PWA are more likely to own a mobile device than a desktop/laptop and report a preference for using apps that are integrated into their devices rather than specialist SLT software [148]. Therefore, the focus of the "computer" component on ICAPs might be better placed on the use of mobile devices and mainstream applications, and the term "computer" may be worth re-framing to include technological advancements and awareness that computers can be used to achieve non-impairment-based therapy goals, for example, internet access and social media use.

Group

Group therapy in aphasia was addressed by a minority of researchers where cited benefits included shared experience and peer support, the potential for humour/enjoyment, and raising self-awareness. Hoover et al. provided detail on a wide variety of group therapy formats "a speech-making group (Toastmasters), a writing/newsletter group, a language games group, a current events/conversation group, a book club group" [100,p.85]. It was unclear whether groups were included on some ICAPs to address specific therapeutic aims, or merely as a means of achieving a high therapeutic dose. The therapeutic ratio would be high and costly if most therapies were delivered in 1:1 format. It is evident from some programmes with high levels of 1:1 provision that this limits therapist capacity. For example, PIRATE [112] provided 25 h of 1:1 therapy weekly but limited the cohort size to three participants. In contrast, Hoover et al. [100] provided most of their 15.5 h of weekly SLT therapy in groups or dyads with only three hours given as individual sessions. Their cohort sizes were 6–8 people. Further clarity is required on why groups are important in ICAPs to ensure adequate time is allocated to the unique benefits that can be achieved from group therapy approaches and so they are not viewed as secondary to individual therapy. An exploration of suggested or desired group content would also be valuable.

Targeting multiple levels of the ICF

There was very little rationale provided on why therapy addressed more than just the impairment, perhaps compounded by the primary rationale for an ICAP focusing on intensive therapy. It was clear from the range of intervention activities reported in TIDieR item 4 that ICAPs provided a wide range of therapy approaches targeting multiple aspects of the experience of living with aphasia. However, none of the reviewed papers provided a rationale for this breadth of content. This omission was possibly related to the fact that rationales, in most papers, were restricted to the argument for intensity. Thus, the content of ICAPs was not explicitly related to the complex needs of PWA; and the case was not developed for tackling these complex needs in one programme.

Family members

Education provision for family and/or PWA was listed as a component of ICAPs by Rose et al. but this requirement was so broad that it had to be dropped as an inclusion criterion for this review. The rationale for general inclusion of family was lacking in the articles used in this review. Family involvement where detailed varied from observation of sessions to being in receipt of weekly counselling groups by qualified counselling staff [111]. This may be similar to the variation seen in a TIDieR analysis of 56 studies of communication partner training, where family involvement for this single therapy approach varied considerably [77]. Some articles stipulated caregiver involvement at the outset but later noted that caregiver involvement was not essential or possible. Off et al. [111] suggest that not everyone has a caregiver/family member/significant other who can attend an ICAP. Family may not always be of assistance to the participant and their presence may not be desired by the participant. It is not clear in the ICAP literature whether PWA have been asked about their preferences for family member inclusion on an ICAP, and indeed whether family members/caregivers desire involvement and for what purpose. The rationale for involving family might be supported by evidence that this was desired by PWA or family members or enhances treatment outcomes for the PWA or family member [12,48,53,141,149,150]. If the family is required to attend, this may exclude PWA with family who cannot or are unwilling to attend (e.g., due to work commitments) or to those without family. If the family is to be involved, the goal of its involvement and methods of involving it should be more thoroughly explored.

Other aspects of comprehensiveness

Although not stipulated in the definition of an ICAP, almost half involved other professionals. It was not clear why others were involved; there was no clear dominance of a single profession with at least seven different professions represented, and the specific procedures conducted by other professionals were not well detailed. As mentioned, the hours of therapy provided by non-SLTs were not always counted under the total intensity of the intervention. This sends a contradictory message. Presumably, other professionals were included for a reason, and yet discounting their input suggests they were not providing an active part of the intervention. This is another indication that ICAPs lack a logic model [151–153] where the rationale for the inclusion of other professionals is outlined and linked to therapy outcomes. In many countries, the voluntary/charity sector supplements the provision of healthcare generally, and yet there is an absence of professionals affiliated with that background in the peer-reviewed ICAP literature. The Rose et al. paper does not stipulate who should provide intervention on an ICAP [69]. It is worth considering whether the definition of an ICAP requires it to be an SLT-only or SLT-led approach and whether a multi-disciplinary ICAP is a separate concept. There is no literature on the views of SLTs or participants regarding uni/multi-disciplinary therapy provision in an ICAP.

Cohort

Another core concept of an ICAP is that it must be delivered to a cohort of people starting and ending at the same time [69]. Only one article provided detail on the inherent value of a cohort, but primarily from the perspective of caregivers. Off et al. [111] hypothesized that the benefit of the cohort comes from its immersive nature whereby caregivers build a sense of collectiveness. The cohort benefits are felt to extend beyond those of structured groups to build "long-lasting, meaningful support and friendship networks" [111,p.8]. The authors suggested that added benefits come from opportunities to share lunch breaks and other informal social opportunities. The rationale and requirement for a cohort on an ICAP are unclear. It may be related to the need to schedule, plan, run, and staff an ICAP session. This is acknowledged by Off et al. who reported that the cohort model facilitated logistical planning [111]. Some ICAPs were residential which may have also facilitated more cohort bonding outside of therapy time. Some had more emphasis on 1:1 sessions [112] with less time to engage as a cohort. An interesting comparison would be with patients on in-patient or rehabilitation wards who may experience a cohort-like effect from shared mealtimes in communal rooms on the ward, joint attendance at therapy groups or in the therapy gym, or interaction on shared bays which may not be limited to interaction with others with aphasia. The oldest article was the only one with a mixed cohort of PWA and others with acquired brain injury (ABI) without aphasia [135]. It was unclear whether this had any impact on the cohort and no comparison was possible with the other studies.

Although not specifically argued for in most of the reviewed papers, a likely rationale for working with a cohort is the associated peer support. A study of an inpatient peer-support group for stroke survivors with and without aphasia reported connection, friendship, increased confidence, and awareness as perceived benefits [154]. A recent systematic review [155] of peer support groups for people with ABI with and without aphasia found limited evidence for psychosocial effectiveness but reported that peer support was largely a positive experience for attendees, primarily for reasons of connectedness and support. A recent systematic review has identified that being single and from a non-Western background is linked to a greater need for peer support post-ABI and those that derived the greatest benefit were more than three months post-onset and younger than 60 (as were the matched peer supporters) [156]. There is currently no evidence to support the cost-effectiveness of peer support in mental health populations, but the high probability that this affordable intervention reduced hopelessness [157]. Consideration should be given to the necessity of a cohort on an ICAP. The theory should be provided on the benefit of the cohort as unique from group intervention. The time that should be allocated to achieve these benefits should be considered.

Tailoring

As previously noted, this review took a broad interpretation of tailored interventions to encompass those individualised to the participant. There was a high degree of individualised intervention provided on ICAPs, linked to consideration for individual goals and the variation in individual presentations. The World Health Organization promotes person-centred care [158] which includes individualised interventions, and best practice guidelines recommend intervention tailored to a PWA's specific presentation and needs [159]. While this may enhance the patient experience, individualisation makes it all the more difficult to identify the active ingredient in ICAPs. It will also be challenging for the ICAP field to prove the efficacy of the service delivery model if the content of therapy is so highly individualised. In addition, it is arguable that such highly individual tailoring of intervention could be viewed as a modification of the intervention. It is clear that what was received on an ICAP fell inside some definable core concepts for every participant, but their daily experience of 1:1 sessions, in particular, may have differed considerably. This is not an unknown issue when it comes to complex interventions or the field of rehabilitation, and it would not be possible or desirable to provide a standardised intervention to people presenting with different levels of impairment, different social challenges, different environmental contexts, and different goals. However, it is a challenge to compare across ICAP programmes when there is significant within-programme tailoring or modification to the participant's experience.

Adherence and fidelity

Adherence to ICAPs (where reported) was upwards of 85–100%. This is surprising given the finding that high-intensity treatment is more likely to result in drop-out [5]. Though not a question for this review, participant profiles will be explored in future research as ICAP participants may not be typical of the wider stroke and aphasia population. Screening for "desirable" participants whereby those with additional frailties or fatigue may be excluded might also influence high rates of adherence. The cost of an ICAP may be a factor in high levels of adherence. In the articles, ICAP costs were never reported, but this information was collected for a 2016 master's thesis where ICAP costs were reported as between $70 and $5229 per week per person depending on subsidies/accommodation/meals/length of programme [160]. Some of the ICAPs maintained high levels of attendance even when there was no cost implication for participants, for example, for active USA service members or veterans [112] or via a Nationalised Healthcare System [115]. There was no concrete fidelity data

presented for any ICAP. This would likely be a problematic and complex undertaking given the individualised nature of each ICAP.

Lack of qualitative data

Though one article elicited views of clinicians delivering ICAPs [144] and another explored clinicians' views on experienced and perceived barriers to ICAP implementation [161], the literature provides no qualitative data from PWA or significant others about the perceived value of ICAPs. It is crucial to access the insights, lived experience, and expertise of PWA, their families, and key stakeholders in intervention design and this process is a recommended key stage in the development of a complex intervention [162,163].

Limitations

Given the results were filtered only in the English language, it is possible the systematic search missed results from non-English speaking countries. The searches were also conducted some months ago, and it is possible that some more ICAP research studies have been subsequently published. The 14 ICAPs reported only in the Grey literature did not undergo data extraction as some of these results were corporate websites of ICAP providers or low quality and reporting unverifiable information. In addition, the quality of information provided in the peer-reviewed sources was sufficient to document ICAP content as per the TIDieR checklist. However, information from the Grey literature may in some cases have added additional information to our understanding of what constitutes an ICAP, particularly given these ICAPs were actively running unlike many in the peer-reviewed literature. This review used the TIDieR checklist [70] to document the ICAP service delivery model. However, the authors experienced limitations with the TIDieR checklist, specifically that the checklist does not indicate how to manage when information is minimally or partially present. Table 1 lists information present as per the TIDieR checklist and the results could be viewed as relatively good reporting of intervention content. However, the authors applied a low threshold for accepting that some detail was present, and as the narrative reveals, overall ICAP interventions are not documented to a replicable quality. The TIDieR checklist could be updated to provide guidance on minimum standards for adequate reporting of each item.

Conclusion

This article addressed the question "What constitutes an ICAP." This review has answered that question primarily using the peer-reviewed literature, providing an overview of the rationales for ICAP intervention, materials used, procedures enacted, information on providers, methods of delivery, locations, dose, tailoring, and adherence. An ICAP is a definable service delivery model but some core concepts such as intensity are easier to evidence than others such as education. The described ICAPs have emerged from different centres in a seemingly un-coordinated fashion. This has resulted in widely differing and often partially described practices falling under the ICAP banner. Issues resulting from this disparity include the poor rationale for the ICAP approach, whereby the rationale was largely present for intensive therapy delivery only. Materials are severely under-reported as are the activities of other professionals involved in an ICAP. ICAPs make use of a variety of modes of delivery but some have a much stronger focus on 1:1 rather than group sessions, or vice versa. Though each ICAP reached the minimum standard of therapy hours, the dose was poorly detailed. There is extensive personalisation of therapies received on ICAP interventions and overall high adherence to the programme.

In their paper on a research agenda for ICAPs, Hula et al. state that "like any intervention, the components, as well as the whole, should be informed by evidence" [164,p.409]. This review supports that conclusion and suggests it would be valuable to bring more cohesion to the ICAP model by going through key stages required for the development of complex interventions, in particular reviewing the existing theories and evidence for ICAP provision and including stakeholders in the intervention design. This includes eliciting participant views on ICAP intervention; exploration of the unique benefits of a cohort above and beyond opportunities to mix with non-cohort members with or without aphasia; the specific benefits of group and computer therapy and what time allocation and suggested content should be included for these therapy formats; a need to specify what is meant by "education" to PWA and/or their families; and given the wide variety of activities enacted on an ICAP and the common inclusion of other professionals, a definition of comprehensive intervention as it pertains to an ICAP may be needed. In addition, ICAPs lack a logic model. A logic model demonstrates how the intervention ingredients relate to intervention outcomes [151–153]. It is not clear from the studies explored in this review how the key ingredients of the ICAP are thought to complement each other. Reporting of a logic model is advised when developing and evaluating complex interventions [165] and there is emerging evidence of the use of logic models in the field of SLT [166]. Future research leading from this review will develop a logic model for ICAPs. Future research could explore systematically adding or subtracting ICAP elements in order to tease apart the essential components. Future ICAP research would benefit from the use of the TIDieR checklist to report interventions and an excellent example can be found in the supplementary material of the "from controlled experimental trial to = 2 everyday communication" (FCET2EC) trial run by Breitenstein et al. [78]. It is important for participants to be assured that this service delivery model which promises to provide the highest standards of intensity and comprehensiveness is grounded in strong theory, is clear about the active components of treatment, and integrates service user feedback to ensure this aphasia therapy model is of optimal benefit to PWA and their families.

ICAPs are an exciting service delivery model which has evolved and is growing in popularity as evidenced by the Grey literature data. Though this review finds that the model needs further research, it is important to acknowledge that ICAPs currently run worldwide and clinicians interested in this area need more immediate direction. Pending the outcome of future research into ICAPs, those interested in the model may wish to read the barriers and facilitators to ICAPs outlined in the paper by Trebilcock et al. [161] which would help determine resources required within their setting to run an ICAP. Given the disparity in content between ICAPs, it may also be beneficial for SLTs to select just one of the ICAP studies included in this review (and detailed in Tables 2–4) if they wish to replicate the model within their service.

Note

1. Tweet from Dr. Cathy Off 2020 June 18, head of Big Sky Montana ICAP: "In anticipation of Zoom fatigue, we modified

our ICAP from 5 hours per day, 4 days per week, for 4 weeks to 5 hours per day, 3 days per week, for 3 weeks. But the theme of today's focus group was that they all want more, even on Zoom!"

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References

[1] Chapey R, editor. Language intervention strategies in aphasia and related neurogenic communication disorders. 5th ed. Philadelphia (PA): Wolters Kluwer, Lippincott Williams & Wilkins; 2008.
[2] Stroke Association [Internet]. State of the nation stroke statistics. London (UK): Stroke Association; 2018. Available from: https://www.stroke.org.uk/sites/default/files/state_of_the_nation_2018.pdf
[3] Aphasia awareness [Internet]. London (UK): Stroke Association; 2019 [cited 2019 Nov 6]. Available from: https://www.stroke.org.uk/what-is-aphasia/aphasia-awareness
[4] Aphasia [Internet]. Bethesda (MD): National Institute on Deafness and Other Communication Disorders; 2017 [cited 2020 Jun 23]. Available from: https://www.nidcd.nih.gov/health/aphasia.
[5] Brady MC, Kelly H, Godwin J, et al. Speech and language therapy for aphasia following stroke. Cochrane Database Syst Rev. 2016;6:CD000425.
[6] Ward NS, Brander F, Kelly K. Intensive upper limb neurorehabilitation in chronic stroke: outcomes from the queen square programme. J Neurol Neurosurg Psychiatry. 2019;90(5):498–506.
[7] Robey RR. A Meta-analysis of clinical outcomes in the treatment of aphasia. J Speech Lang Hear Res. 1998;41(1):172–187.
[8] Wang G, Ge L, Zheng Q, et al. Constraint-induced aphasia therapy for patients with aphasia: a systematic review. Int J Nurs Sci. 2020;7(3):349–358.
[9] Pulvermuller F, Neininger B, Elbert T, et al. Constraint-induced therapy of chronic aphasia after stroke. Stroke. 2001;32(7):1621–1626.
[10] Stahl B, Mohr B, Buscher V, et al. Efficacy of intensive aphasia therapy in patients with chronic stroke: a randomised controlled trial. J Neurol Neurosurg Psychiatry. 2018;89(6):586–592.
[11] Bhogal SK, Teasell R, Speechley M. Intensity of aphasia therapy, impact on recovery. Stroke. 2003;34(4):987–992.
[12] Simmons-Mackie N, Worrall L, Murray LL, et al. The top ten: best practice recommendations for aphasia. Aphasiology. 2017;31(2):131–151.
[13] National Stroke Foundation [Internet]. Clinical guidelines for stroke management 2010. Melbourne (Australia): National Stroke Foundation; 2010. Available from: https://strokefoundation.org.au/what-we-do/treatment-programs/clinical-guidelines
[14] Stroke Foundation of New Zealand [Internet]. New Zealand clinical guidelines for stroke management 2010. Wellington (NZ): Stroke Foundation of New Zealand; 2010. Available from: https://www.health.govt.nz/system/files/documents/publications/nzclinicalguidelinesstrokemanagement2010activecontents.pdf
[15] Scottish Intercollegiate Guidelines Network [Internet]. Management of patients with stroke: rehabilitation, prevention and management of complications, and discharge planning: a national clinical guideline. Edinburgh (Scotland): Scottish Intercollegiate Guidelines Network; 2010. Available from: https://www.sign.ac.uk/our-guidelines/management-of-patients-with-stroke-rehabilitation-prevention-and-management-of-complications-and-discharge-planning/
[16] Miller EL, Murray L, Richards L, et al. Comprehensive overview of nursing and interdisciplinary rehabilitation care of the stroke patient: a scientific statement from the American Heart Association. Stroke. 2010;41(10):2402–2448.
[17] US Department of Veterans Affairs/Department of Defense [Internet]. VA/DoD clinical practice guideline for the management of stroke rehabilitation. Version 4.0. Washington (DC): US Department of Veterans Affairs/Department of Defense; 2019. Available from: https://www.healthquality.va.gov/guidelines/Rehab/stroke/VADoDStrokeRehabCPGFinal8292019.pdf
[18] Intercollegiate Stroke Working Party [Internet]. National clinical guideline for stroke. Fifth edition. London (UK): Royal College of Physicians; 2016. Available from: https://www.strokeaudit.org/SupportFiles/Documents/Guidelines/2016-National-Clinical-Guideline-for-Stroke-5t-1.aspx
[19] Stroke Care [Internet]. London (UK): The Nuffield Trust; 2019 [cited 2019 Oct 3]. Available from: https://www.nuffieldtrust.org.uk/public/resource/stroke-care
[20] Sentinal Stroke National Audit Programme: National Results – Clinical Annual Results Portfolio [dataset]. Sentinal Stroke National Audit Programme [Internet]. 2018. [cited 2020 Jul 27]. Available from: https://www.strokeaudit.org/results/Clinical-audit/National-Results.aspx.
[21] Royal College of Speech and Language Therapists [Internet]. RCSLT resource manual for commissioning and planning services for SLCN: dysphagia. Updated 18/06/2013, minor amendments 14/07/14. London (UK): Royal College of Speech and Language Therapists; 2009. Available from: https://www.rcslt.org/-/media/Project/RCSLT/resource-manual-dysphagia.pdf
[22] Foster A, O'Halloran R, Rose M, et al. "Communication is taking a back seat": speech pathologists' perceptions of aphasia management in acute hospital settings. Aphasiology. 2016;30(5):585–608.

[23] Rose M, Ferguson A, Power E, et al. Aphasia rehabilitation in Australia: current practices, challenges and future directions. Int J Speech Lang Pathol. 2014;16(2):169–180.
[24] Code C, Petheram B. Delivering for aphasia. Int J Speech Lang Pathol. 2011;13(1):3–10.
[25] Katz RC, Hallowell B, Code C, et al. A multinational comparison of aphasia management practices. Int J Lang Commun Disord. 2000;35(2):303–314.
[26] Sentinel Stroke National Audit Programme: Post-Acute Audit [dataset]. Sentinel Stroke National Audit Programme [Internet]. 2015 [cited 2019 Oct 17]. Available from: https://www.strokeaudit.org/results/PostAcute/Services.aspx
[27] Fisher RJ, Gaynor C, Kerr M, et al. A consensus on stroke: early supported discharge. Stroke. 2011;42(5):1392–1397.
[28] Hinckley J. Selecting, combining, and bundling different therapy approaches. In: Coppens P, Patterson J, editors. Aphasia rehabilitation: clinical challenges. Burlington (MA): Jones and Bartlett Learning; 2018. p. 331–353.
[29] Wisenburn B, Mahoney K. A Meta-analysis of word-finding treatments for aphasia. Aphasiology. 2009;23(11):1338–1352.
[30] Dipper L, Marshall J, Boyle M, et al. Treatment for improving discourse in aphasia: a systematic review and synthesis of the evidence base. Aphasiology. 2020. DOI: 10.1080/02687038.2020.1765305.
[31] Rose ML, Raymer AM, Lanyon LE, et al. A systematic review of gesture treatments for post-stroke aphasia. Aphasiology. 2013;27(9):1090–1127.
[32] Brogan E, Ciccone N, Godecke E. Behind the therapy door: what is "usual care" aphasia therapy in acute stroke management? Aphasiology. 2020;34(10):1291–1223.
[33] El Hachioui H, Lingsma H, van de Sandt-Koenderman M, et al. Recovery of aphasia after stroke: a 1-Year Follow-Up study. J Neurol. 2013;260(1):166–171.
[34] Sarno MT, Levita E. Recovery in treated aphasia in the first year post-stroke. Stroke. 1979;10(6):663–670.
[35] Plowman E, Hentz B, Ellis C. Post-stroke aphasia prognosis: a review of patient-related and stroke-related factors. J Eval Clin Pract. 2012;18(3):689–694.
[36] Heiss WD, Thiel A. A proposed regional hierarchy in recovery of post-stroke aphasia. Brain Lang. 2006;98(1):118–123.
[37] Wallace S. Complementing therapy using multimodal strategies. In: Coppens P, Patterson J, editors. Aphasia rehabilitation: clinical challenges. Burlington (MA): Jones and Bartlett Learning; 2018. p. 249–290.
[38] International Classification of Functioning, Disability, and Health (ICF) [Internet]. Geneva (Switzerland): World Health Organisation; 2001 [cited 2020 Jun 24]. Available from: https://www.who.int/classifications/icf/en/
[39] Hilari K, Northcott S. Social support in people with chronic aphasia. Aphasiology. 2006;20(1):17–36.
[40] Fotiadou D, Northcott S, Chatzidaki A, et al. Aphasia blog talk: how does stroke and aphasia affect a person's social relationships? Aphasiology. 2014;28(11):1281–1300.
[41] Parr S, Byng S, Gilpin S. Talking about aphasia. Buckingham (UK): Open University Press; 1997.
[42] Hinckley JJ. Investigating the predictors of lifestyle satisfaction among younger adults with chronic aphasia. Aphasiology. 1998;12(7-8):509–518.
[43] Westerlind E, Persson HC, Sunnerhagen KS. Return to work after a stroke in working age persons; a six-year follow up. PLoS One. 2017;12(1):e0169759.
[44] Wang S, Wang C, Zhang N, et al. The association between post-stroke depression, aphasia, and physical independence in stroke patients at 3-month follow-up. Front Psychiatry. 2018;9:374.
[45] Morris R, Eccles A, Ryan B, et al. Prevalence of anxiety in people with aphasia after stroke. Aphasiology. 2017;31(12):1410–1415.
[46] Rafsten L, Danielsson A, Sunnerhagen KS. Anxiety after stroke: a systematic review and Meta-analysis. J Rehabil Med. 2018;50(9):769–778.
[47] Lam JMC, Wodchis WP. The relationship of 60 disease diagnoses and 15 conditions to preference-based health-related quality of life in Ontario hospital-based long-term care residents. Med Care. 2010;48(4):380–387.
[48] Howe T, Davidson B, Worrall L, et al. 'You needed to rehab … families as well': family members' own goals for aphasia rehabilitation. Int J Lang Commun Disord. 2012;47(5):511–521.
[49] Ford A, Douglas J, O'Halloran R. The experience of close personal relationships from the perspective of people with aphasia: thematic analysis of the literature. Aphasiology. 2018;32(4):367–393.
[50] Grawburg M, Howe T, Worrall L, et al. Describing the impact of aphasia on close family members using the ICF framework. Disabil Rehabil. 2014;36(14):1184–1195.
[51] Holland A. Counseling/coaching in chronic aphasia. Top Lang Disord. 2007;27(4):339–350.
[52] Simmons-Mackie N, Raymer A, Armstrong E, et al. Communication partner training in aphasia: a systematic review. Arch Phys Med Rehabil. 2010;91(12):1814–1837.
[53] Simmons-Mackie N, Raymer A, Cherney LR. Communication partner training in aphasia: an updated systematic review. Arch Phys Med Rehabil. 2016;97(12):2202–2221.
[54] Palmer R, Witts H, Chater T. What speech and language therapy do community dwelling stroke survivors with aphasia receive in the UK? PLoS One. 2018;13(7):e0200096.
[55] Davidson B, Worrall L. Living with aphasia: a client-centered approach. In: Papathanasiou I, Coppens P, Potagas C, editors. Aphasia and related neurogenic communication disorders. Burlington (MA): Jones & Bartlett Learning; 2013. p. 255–274.
[56] Elman RJ, Bernstein-Ellis E. The efficacy of group communication treatment in adults with chronic aphasia. J Speech Lang Hear Res. 1999;42(2):411–419.
[57] Lanyon LE, Rose ML, Worrall L. The efficacy of outpatient and community-based aphasia group interventions: a systematic review. Int J Speech Lang Pathol. 2013;15(4):359–374.
[58] Vickers CP. Social networks after the onset of aphasia: the impact of aphasia group attendance. Aphasiology. 2010;24(6–8):902–913.
[59] Marshall J, Caute A, Chadd K, et al. Technology-enhanced writing therapy for people with aphasia: results of a quasi-randomized waitlist controlled study. Int J Lang Commun Disord. 2019;54(2):203–220.
[60] Caute A, Woolf C, Wilson S, et al. Technology-enhanced reading therapy for people with aphasia: findings from a quasirandomized waitlist controlled study. J Speech Lang Hear Res. 2019;62(12):4382–4416.
[61] Internet access - households and individuals [Internet]. London (UK): Office for National Statistics. 2019 [cited

2019 Aug 15]. Available from: https://www.ons.gov.uk/peoplepopulationandcommunity/householdcharacteristics/homeinternetandsocialmediausage/bulletins/internetaccesshouseholdsandindividuals/2019
[62] Zheng C, Lynch L, Taylor N. Effect of computer therapy in aphasia: a systematic review. Aphasiology. 2016;30(2–3):211–244.
[63] Lavoie M, Macoir J, Bier N. Effectiveness of technologies in the treatment of post-stroke anomia: a systematic review. J Commun Disord. 2017;65:43–53.
[64] Stroke Association. Lived experience of stroke chapter 4 - rebuilding lives after stroke [Internet]. London (UK): Stroke Association; 2018. Available from: https://www.stroke.org.uk/lived-experience-of-stroke-report/chapter-4-rebuilding-lives-after-stroke
[65] Stroke Association. Lived experience of stroke chapter 1 - hidden effects of stroke [Internet]. London (UK): Stroke Association; 2018. Available from: https://www.stroke.org.uk/lived-experience-of-stroke-report/chapter-1-hidden-effects-of-stroke
[66] Stroke Association. Lived experience of stroke chapter 3 - caring for a stroke survivor [Internet]. London (UK): Stroke Association; 2018. Available from: https://www.stroke.org.uk/lived-experience-of-stroke-report/chapter-3-caring-for-a-stroke-survivor
[67] University of Michigan [Internet]. The institute for human adjustment. Ann Arbor (MI): University of Michigan; 1947. Available from: https://babel.hathitrust.org/cgi/pt?id=mdp.39015014559796&view=1up&seq=6
[68] Bentley Historical Library [Internet]. Teletour – speech clinic. Ann Arbor (IL): University of Michigan; 1950. 21:59 min, sound, black & white. Available from: https://bentley.mivideo.it.umich.edu/media/1_bt3mredx.
[69] Rose ML, Cherney LR, Worrall LE. Intensive comprehensive aphasia programs: an international survey of practice. Top Stroke Rehabil. 2013;20(5):379–387.
[70] Hoffmann TC, Glasziou PP, Boutron I, et al. Better reporting of interventions: template for intervention description and replication (TIDieR) checklist and guide. BMJ. 2014;348:g1687.
[71] Pollock A, Farmer SE, Brady MC, et al. Interventions for improving upper limb function after stroke. Cochrane Database Syst Rev. 2014;11:CD010820.
[72] Saunders DH, Sanderson M, Hayes S, et al. Physical fitness training for stroke patients. Cochrane Database Syst Rev. 2020;3:CD003316.
[73] Yamato TP, Maher CG, Saragiotto BT, et al. How completely are physiotherapy interventions described in reports of randomised trials? Physiotherapy. 2016;102(2):121–126.
[74] Ludemann A, Power E, Hoffmann TC. Investigating the adequacy of intervention descriptions in recent speech-language pathology literature: is evidence from randomized trials useable? Am J Speech Lang Pathol. 2017;26(2):443–455.
[75] Rose ML, Ali M, Elders A, et al. Tidier descriptions of speech and language therapy interventions for people with aphasia; consensus from the RELEASE collaboration. Aphasiology. 2018;32(1):183–186.
[76] RELEASE Collaboration. Communicating simply, but not too simply: reporting of participants and speech and language interventions for aphasia after stroke. Int J Speech-Lang Pathol. 2020;22:302–312.
[77] Cruice M, Blom Johansson M, Isaksen J, et al. Reporting interventions in communication partner training: a critical review and narrative synthesis of the literature. Aphasiology. 2018;32(10):1135–1166.
[78] Breitenstein C, Grewe T, Flöel A, et al. Intensive speech and language therapy in patients with chronic aphasia after stroke: a randomised, open-label, blinded-endpoint, controlled trial in a health-care setting. Lancet. 2017;389(10078):1528–1538.
[79] Palmer R, Dimairo M, Cooper C, et al. Self-managed, computerised speech and language therapy for patients with chronic aphasia post-stroke compared with usual care or attention control (big CACTUS): a multicentre, single-blinded, randomised controlled trial. Lancet Neurol. 2019;18(9):821–833.
[80] Dipper LT, Franklin S, De Aguiar V, et al. An umbrella review of aphasia intervention descriPtion in research: the AsPIRE project. Aphasiology. 2021. DOI: 10.1080/02687038.2020.1852001.
[81] Albrittain-Ross N, Ross K, Gilmore N, et al. Intensive cognitive communication rehabilitation (ICCR) program for young adults with acquired brain injury. Poster presented at the 94th Annual Conference of the American Congress of Rehabilitation Medicine; 2017 October 23–28; Atlanta, GA.
[82] Gilmore N, Foo L, Kiran S. Intensive cognitive-communication rehabilitation for college-bound young adults with brain injury. Aphasiology. 2018;32(1):70–71.
[83] Ross K, Ross N, Gilmore N, et al. A novel approach to intensive cognitive communication rehabilitation for young adults with acquired brain injury. Poster presented at the International Brain Injury Association's 12th World Congress on Brain Injury; 2017 March 29 to April 1; New Orleans, LA.
[84] Gilmore N, Ross K, Kiran S. The intensive cognitive-communication rehabilitation program for young adults with acquired brain injury. Am J Speech Lang Pathol. 2019;28(1S):341–358.
[85] Peters MDJ, Godfrey CM, Khalil H, et al. Guidance for conducting systematic scoping reviews. Int J Evid Based Healthc. 2015;13(3):141–146.
[86] Godin K, Stapleton J, Kirkpatrick SI, et al. Applying systematic review search methods to the grey literature: a case study examining guidelines for school-based breakfast programs in Canada. Syst Rev. 2015;4(1):138.
[87] McGowan J, Sampson M, Salzwedel DM, et al. PRESS peer review of electronic search strategies: 2015 guideline statement. J Clin Epidemiol. 2016;75:40–46.
[88] Fridell M, Edwin S, Von Schreeb J, et al. Health system resilience: what are we talking about? A scoping review mapping characteristics and keywords. Int J Health Policy Manag. 2020;9(1):6–16.
[89] Pham MT, Rajić A, Greig JD, et al. A scoping review of scoping reviews: advancing the approach and enhancing the consistency. Res Synth Methods. 2014;5(4):371–385.
[90] Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Ann Intern Med. 2018;169(7):467–473.
[91] Arksey H, O'Malley L. Scoping studies: towards a methodological framework. Int J Soc Res Methodol. 2005;8(1):19–32.
[92] Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. Implement Sci. 2010;5:69.

[93] Briefing notes for research: involving the public in NHS, public health and social care research [Internet]. Eastleigh (UK): INVOLVE; 2012 [cited 2021 Mar 3]. Available from: https://www.invo.org.uk/resource-centre/resource-for-researchers/

[94] Stansfield C, Dickson K, Bangpan M. Exploring issues in the conduct of website searching and other online sources for systematic reviews: how can we be systematic? Syst Rev. 2016;5(1):191–199.

[95] Mays N, Pope C, Popay J. Systematically reviewing qualitative and quantitative evidence to inform management and policy-making in the health field. J Health Serv Res Policy. 2005;10(1):6–20.

[96] Barnett-Page E, Thomas J. Methods for the synthesis of qualitative research: a critical review. BMC Medical Res Methodol. 2009;9(1):59.

[97] Ryan R. Cochrane consumers and communication review group: data synthesis and analysis. Melbourne (Australia): La Trobe University; 2013. (Narrative data synthesis and analysis).

[98] Helm-Estabrooks N, Whiteside J. Use of life interests and values (LIV) cards for self-determination of aphasia rehabilitation goals. Perspect Neurophysiol Neurogenic Speech Lang Disord. 2012;22(1):6–11.

[99] Whiteside J, Pak Hin Kong A. Therapeutic effect of an intensive comprehensive aphasia program. Paper presented at the Clinical Aphasiology Conference; 2013 May; Tucson, AZ.

[100] Hoover EL, Caplan DN, Waters GS, et al. Communication and quality of life outcomes from an interprofessional intensive, comprehensive, aphasia program (ICAP). Top Stroke Rehabil. 2017;24(2):82–90.

[101] Hoover EL, Carney A. Integrating the iPad into an intensive, comprehensive aphasia program. Semin Speech Lang. 2014;35(1):25–37.

[102] Escher AA, Amlani AM, Viani AM, et al. Occupational therapy in an intensive comprehensive aphasia program: performance and satisfaction outcomes. Am J Occup Ther. 2018;72(3):7203205110p1–7203205110p7.

[103] Dignam J, Copland D, McKinnon E, et al. Intensive versus distributed aphasia therapy: a nonrandomized, parallel-group, dosage-controlled study. Stroke. 2015;46(8):2206–2211.

[104] Rodriguez AD, Worrall L, Brown K, et al. Aphasia LIFT: exploratory investigation of an intensive comprehensive aphasia programme. Aphasiology. 2013;27(11):1339–1361.

[105] Dignam J, Copland D, Rawlings A, et al. The relationship between novel word learning and anomia treatment success in adults with chronic aphasia. Neuropsychologia. 2016;81:186–197.

[106] Hinckley JJ, Craig HK. Influence of rate of treatment on the naming abilities of adults with chronic aphasia. Aphasiology. 1998;12(11):989–1006.

[107] Persad C, Wozniak L, Kostopoulos E. Retrospective analysis of outcomes from two intensive comprehensive aphasia programs. Top Stroke Rehabil. 2013;20(5):388–397.

[108] Ferdinandi A, Duke W. Intensive comprehensive aphasia treatment: a pilot project for British Columbia and preliminary study. Paper presented at the 3rd Canadian Stroke Congress; 2012 Sept 29 to Oct 2; Calgary, AB.

[109] Code C, Torney A, Gildea-Howardine E, et al. Outcome of a one-month therapy intensive for chronic aphasia: variable individual responses. Semin Speech Lang. 2010;31(1):21–33.

[110] Kleim JA, Jones TA. Principles of experience-dependent neural plasticity: implications for rehabilitation after brain damage. J Speech Lang Hear Res. 2008;51(1):S225–S239.

[111] Off CA, Griffin JR, Murray KW, et al. Interprofessional caregiver education, training, and wellness in the context of a cohort model for aphasia rehabilitation. Top Lang Disord. 2019;39(1):5–28.

[112] Winans-Mitrik RL, Hula WD, Dickey MW, et al. Description of an intensive residential aphasia treatment program: rationale, clinical processes, and outcomes. Am J Speech Lang Pathol. 2014;23(2):S330–S342.

[113] Fitzgerald-DeJean D, Rubin SS, Carson RL. An application of the experience sampling method to the study of aphasia: a case report. Aphasiology. 2012;26(2):234–251.

[114] Babbitt EM, Worrall L, Cherney LR. Structure, processes, and retrospective outcomes from an intensive comprehensive aphasia program. Am J Speech Lang Pathol. 2015;24(4):S854–S863.

[115] Mackenzie C. An aphasia group intensive efficacy study. Br J Disord Commun. 1991;26(3):275–291.

[116] Brindley P, Copeland M, Demain C, et al. A comparison of the speech of 10 chronic broca aphasics following intensive and non-intensive periods of therapy. Aphasiology. 1989;3(8):695–707.

[117] Boyle M, Coelho CA. Application of semantic feature analysis as a treatment for aphasic dysnomia. Am J Speech Lang Pathol. 1995;4(4):94–98.

[118] Leonard C, Rochon E, Laird L. Treating naming impairments in aphasia: findings from a phonological components analysis treatment. Aphasiology. 2008;22(9):923–947.

[119] Schwartz MF, Saffran EM, Fink RB, et al. Mapping therapy: a treatment programme for agrammatism. Aphasiology. 1994;8(1):19–54.

[120] Marshall J. The mapping hypothesis and aphasia therapy. Aphasiology. 1995;9(6):517–539.

[121] Whitworth A. Using narrative as a bridge: linking language processing models with real-life communication. Semin Speech Lang. 2010;31(1):64–75.

[122] Meinzer M, Djundja D, Barthel G, et al. Long-term stability of improved language functions in chronic aphasia after constraint-induced aphasia therapy. Stroke. 2005;36(7):1462–1466.

[123] Thompson C, Shapiro L. Treating agrammatic aphasia within a linguistic framework: treatment of underlying forms. Aphasiology. 2005;19(10–11):1021–1036.

[124] Kendall DL, Oelke M, Brookshire CE, et al. The influence of phonomotor treatment on word retrieval abilities in 26 individuals with chronic aphasia: an open trial. J Speech Lang Hear Res. 2015;58(3):798–812.

[125] Edmonds LA, Nadeau SE, Kiran S. Effect of verb network strengthening treatment (VNeST) on lexical retrieval of content words in sentences in persons with aphasia. Aphasiology. 2009;23(3):402–424.

[126] Beeson PM, Hirsch FM, Rewega MA. Successful single-word writing treatment: experimental analyses of four cases. Aphasiology. 2002;16(4–6):473–491.

[127] Wambaugh JL, Kalinyak-Fliszar MM, West JE, et al. Effects of treatment for sound errors in apraxia of speech and aphasia. J Speech Lang Hear Res. 1998;41(4): 725–743.
[128] Hinckley JJ, Patterson JP, Carr TH. Differential effects of context- and skill-based treatment approaches: preliminary findings. Aphasiology. 2001;15(5):463–476.
[129] Davis GA. PACE revisited. Aphasiology. 2005;19(1):21–38.
[130] Chapey R, Duchan JF, Elman RJ, et al. Life participation approach to aphasia: a statement of values for the future. Leader. 2000;5(3):4–6.
[131] Elman R, Bernstein-Ellis E. Aphasia book clubs: making the connection. Stroke Connect. 2006;32–33.
[132] Cherney LR, Halper AS, Holland AL, et al. Computerized script training for aphasia: preliminary results. Am J Speech Lang Pathol. 2008;17(1):19–34.
[133] Cherney LR. Oral reading for language in aphasia (ORLA): evaluating the efficacy of computer-delivered therapy in chronic nonfluent aphasia. Top Stroke Rehabil. 2010;17(6): 423–431.
[134] Steps Consulting Ltd. StepByStep Aphasia Therapy [Computer Programme]. Acton Turville (UK): Steps Consulting Ltd.; 2020.
[135] Prigatano GP, Fordyce DJ, Zeiner HK, et al. Neuropsychological rehabilitation after closed head injury in young adults. J Neurol Neurosurg Psychiatry. 1984; 47(5):505–513.
[136] Jensen LR, Lønnberg C. Return to work with aphasia: review of the literature and preliminary vocational outcome of an intensive rehabilitation programme. Paper presented at the 2nd Nordic Aphasia Conference; 2009 May 14–16; Copenhagen, DE.
[137] Pierce JE, O'Halloran R, Menahemi-Falkov M, et al. Comparing higher and lower weekly treatment intensity for chronic aphasia: a systematic review and meta-analysis. Neuropsychol Rehabil. 2020;31(8):1289–1313.
[138] Harvey SR, Carragher M, Dickey MW, et al. Treatment dose in post-stroke aphasia: a systematic scoping review. Neuropsychol Rehabil. 2020. DOI:10.1080/09602011.2020.1786412.
[139] Shadden B. Aphasia as identity theft: theory and practice. Aphasiology. 2005;19(3–5):211–223.
[140] Lindsay J, Parr S, Pound C, et al. Beyond aphasia: therapies for living with communication disability. Bicester (UK): Winslow Press; 2000.
[141] Manning M, MacFarlane A, Hickey A, et al. Perspectives of people with aphasia post-stroke towards personal recovery and living successfully: a systematic review and thematic synthesis. PLoS One. 2019;14(3):e0214200.
[142] Tregea S, Brown K. What makes a successful peer-led aphasia support group? Aphasiology. 2013;27(5):581–598.
[143] Rotherham A, Howe T, Tillard G. "We just thought that this was Christmas": perceived benefits of participating in aphasia, stroke, and other groups. Aphasiology. 2015; 29(8):965–982.
[144] Babbitt EM, Worrall LE, Cherney LR. Clinician perspectives of an intensive comprehensive aphasia program. Top Stroke Rehabil. 2013;20(5):398–408.
[145] Weidner K, Lowman J. Telepractice for adult speech-language pathology services: a systematic review. Perspect ASHA Sigs. 2020;5(1):326–338.
[146] LIFT home: comprehensive aphasia rehabilitation through telerehabilitation [Internet]. Melbourne (Australia): La Trobe University; 2020 [cited 2020 Jul 24]. Available from: https://www.latrobe.edu.au/research/centres/health/aphasia/research/technology
[147] Chadd K, Moyse K, Enderby P. Impact of COVID-19 on the speech and language therapy profession and their patients. Front Neurol. 2021;12:629190.
[148] Technology and aphasia review [Internet]. 2018 [cited 2020 Jul 24]. Available from: http://www.aphasiafriendly.co/aphasia-and-technology.html
[149] Wallace SJ, Worrall L, Rose R, et al. Which outcomes are most important to people with aphasia and their families? an international nominal group technique study framed within the ICF. Disabil Rehabil. 2017;39(14): 1364–1379.
[150] Luker J, Murray C, Lynch E, et al. Carers' experiences, needs, and preferences during inpatient stroke rehabilitation: a systematic review of qualitative studies. Arch Phys Med Rehabil. 2017;98(9):1852–1862.
[151] Randolph KA. Logic models. In: Thyer BA, editor. The handbook of social work research methods. 2nd ed. Thousand Oaks (CA): SAGE research methods. 2010.
[152] Smith JD, Li DH, Rafferty MR. The implementation research logic model: a method for planning, executing, reporting, and synthesizing implementation projects. Implement Sci. 2020;15(1):84.
[153] WK Kellogg Foundation [Internet]. Logic model development guide. Battle Creek (MI): WK Kellogg Foundation; 2004. Available from: https://www.wkkf.org/resource-directory/resources/2004/01/logic-model-development-guide.
[154] Morris R, Morris P. Participants' experiences of hospital-based peer support groups for stroke patients and carers. Disabil Rehabil. 2012;34(4):347–354.
[155] Hughes R, Fleming P, Henshall L. Peer support groups after acquired brain injury: a systematic review. Brain Inj. 2020;34(7):847–856.
[156] Wobma R, Nijland R, Kwakkel G. Patient characteristics related to the need for peer support in rehabilitation after acquired brain injury: a prospective cohort study in The Netherlands. BMJ Open. 2019;9(7):e025665.
[157] Simpson A, Flood C, Rowe J, et al. Results of a pilot randomised controlled trial to measure the clinical and cost effectiveness of peer support in increasing hope and quality of life in mental health patients discharged from hospital in the UK. BMC Psychiatry. 2014;14(1):30.
[158] World Health Organization [Internet]. Framework on integrated, people-centred health services. Geneva (Switzerland): World Health Organization; 2016 [cited 2020 Jul 28]. Available from: https://apps.who.int/gb/ebwha/pdf_files/WHA69/A69_39-en.pdf?ua=1&ua=1
[159] Aphasia rehabilitation best practice statements: comprehensive supplement to the Australian aphasia rehabilitation pathway [Internet]. St Lucia (Australia): Clinical Centre for Research Excellence in Aphasia Rehabilitation; 2014 [cited 2020 Jun 22]. Available from: http://www.aphasiapathway.com.au/?name=About-the-statements
[160] Henson DM. An intensive aphasia needs assessment tool [master's thesis]. Bowling Green (KY): Western Kentucky University; 2016.
[161] Trebilcock M, Worrall L, Ryan B, et al. Increasing the intensity and comprehensiveness of aphasia services: identification of key factors influencing

implementation across six countries. Aphasiology. 2019;33(7):865–887.
[162] O'Cathain A, Croot L, Duncan EAS, et al. Guidance on how to develop complex interventions to improve health and healthcare. BMJ Open. 2019; 9(8):e029954.
[163] Craig P, Dieppe P, Macintyre S, et al. Developing and evaluating complex interventions: the new medical research council guidance. Int J Nurs Stud. 2013;50(5): 587–592.
[164] Hula W, Cherney L, Worrall L. Setting a research agenda to inform intensive comprehensive aphasia programs. Top Stroke Rehabil. 2013;20(5):409–420.
[165] Moore GF, Audrey S, Barker M, et al. Process evaluation of complex interventions: Medical Research Council guidance. BMJ. 2015;350:h1258.
[166] Gauvreau CA, Le Dorze G, Kairy D, et al. Evaluation of a community of practice for speech-language pathologists in aphasia rehabilitation: a logic analysis. BMC Health Serv Res. 2019;19(1):530