APHASIOLOGY
2025, VOL. 39, NO. 5, 647–666
https://doi.org/10.1080/02687038.2024.2368623

Routledge
Taylor & Francis Group

The impact of a university-based intensive comprehensive aphasia programme (ICAP) on language, functional communication and quality of life in people with chronic aphasia

Monia Molino[a], Aisling Egan[b] and Anja Kuschmann[a]

[a]Department of Psychological Sciences and Health, University of Strathclyde, Glasgow, UK;
[b]Logopädieschule Recura Akademie für Sozial- und Gesundheitsberufe, Potsdam, Germany

ABSTRACT

Background: Intensive Comprehensive Aphasia Programmes (ICAPs) are increasingly considered the preferred option for high intensity aphasia rehabilitation. This is due to the emerging evidence that shows the potential of the programme to improve language impairment as well as psychosocial wellbeing and quality of life (QoL) in persons with chronic aphasia.

Aims: The aim of the study was to investigate whether a university-based, student-led, online ICAP led to measurable improvements in language, functional communication and QoL in persons with aphasia (PwAs).

Methods & Procedures: Eleven PwAs (six women, five men; M age = 60.4 years; M time post onset = 14.6 months) participated in a 10-week ICAP that provided 36 hours of treatment in total. Outcome measures relating to language impairment, functional communication and QoL were administered before and after the ICAP and included a range of subtests of the Comprehensive Aphasia Test (CAT) and the Communication Activities of Daily Living – second edition (CADL-2), the Assessment for Living with Aphasia (ALA), the Aphasia Impact Questionnaire (AIQ-21) and the Communication Outcomes after Stroke Scale (Carer COAST). Pre- and post-ICAP performances were tested for significance using Wilcoxon signed-rank tests. In addition, effect sizes were calculated.

Outcomes & Results: Post-ICAP, significant gains occurred in the CAT subtests of auditory and reading comprehension as well as naming objects, with large effect sizes being noted for the subtests of reading comprehension and naming objects. Significant changes were also observed between the pre- and post-assessment scores for the AIQ-21 and the Carer COAST, whereby the latter yielded large effect sizes. By contrast, CADL-2 and ALA scores did not change significantly as a result of the ICAP intervention.

Conclusions: Results indicate that the ICAP effectively improved participants' language and functional communication skills, as well

ARTICLE HISTORY

Received 11 March 2024
Accepted 12 June 2024

KEYWORDS

Intensive comprehensive aphasia programme (ICAP); aphasia; chronic; quality of life

CONTACT Anja Kuschmann anja.kuschmann@strath.ac.uk Department of Psychological Sciences and Health, University of Strathclyde, 40 George Street, Glasgow G1 1QE, Scotland, UK

Supplemental data for this article can be accessed online at https://doi.org/10.1080/02687038.2024.2368623

as QoL for both PwAs and their communication partners. Findings further indicate that a student-led ICAP implemented in a university setting can be considered a viable and pragmatic solution to offering ICAPs to achieve the high intensity needed to effect positive changes in communication.

Introduction

Stroke care and the management of the consequences of stroke is a priority policy issue in Scotland (Public Health Scotland, 2021), and the wider UK healthcare landscape (National Clinical Guideline for Stroke for the UK and Ireland, 2023). One of the consequences of a stroke can be aphasia, a language disorder impacting the comprehension and production of language. Individuals with aphasia report greater impacts on health-related quality of life (QoL), wellbeing, and mood than individuals without aphasia (e.g., Døli et al., 2017; Hilari, 2011). The condition's profound impact on communication can lead to social isolation, frustration, and reduced participation in daily activities (Hilari et al., 2019). As around 30% of stroke survivors present with signs of aphasia from stroke onset (e.g., Flowers et al., 2013; Grönberg et al., 2022), its potential to negatively impact QoL, wellbeing and mood make aphasia a key focus of stroke rehabilitation.

Aphasia rehabilitation

Speech and language therapy can effectively rehabilitate the language and communication difficulties associated with aphasia when intervention is delivered intensively (Brady et al., 2016). Higher intervention intensity has shown to lead to better outcomes in language recovery and functional communication (e.g., Brady et al., 2016; Kurland et al., 2021). Additionally, a functional and tailored intervention approach maximises effectiveness (Brady et al., 2022).

Whilst national stroke guidelines recommend that "people with aphasia after stroke should be given the opportunity to improve their language and communication abilities as frequently and as long as they continue to make meaningful gains" (p.71; National Clinical Guideline for Stroke for the United Kingdom and Ireland, 2023), factors such as limited resources mean intensive intervention is difficult to deliver in standard UK NHS settings (Monnelly et al., 2023; Palmer et al., 2018), and this is also reflected internationally (Trebilcock et al., 2019). An approach which has been shown to be effective in delivering intensive therapeutic input for people with post-stroke chronic aphasia, while being comprehensive in scope by incorporating individual and group sessions, patient/family education and technological advances, is intensive comprehensive aphasia programmes (ICAPs; Rose et al., 2013).

ICAPs as an intervention approach for aphasia

ICAPs involve specialised, personalised intervention sessions for a group of participants with aphasia who engage in both individual and group intervention that target impairment and activity/participation of language and communication functioning during an

intensive period. The intervention should run for a minimum of three hours each day, for at least two weeks, resulting in a minimum total duration of 30 hours (Rose et al., 2013). While the basic parameters of an ICAP are clearly defined, there is a notable divergence among programmes in terms of their therapeutic content and approaches used, as well as intervention intensity and duration (Griffin-Musick et al., 2024; Monnelly et al., 2021). For instance, speech and language therapists (SLTs) in the UK provide a diverse array of aphasia therapies within ICAPs, focussing on both functional language and impairment-based interventions (Monnelly et al., 2023). Beyond this, SLTs apply their discretion to the implementation of these approaches.

Regarding the intensity and duration of ICAP programmes, Monnelly et al. (2021) found that most ICAPs ran over four weeks, though the number of overall hours provided varied considerably. Babbitt et al. (2015), for instance, conducted a study with an extensive schedule of six hours per day, five days a week, spanning four weeks, for a total intervention duration of 120 hours. In contrast, Rodriguez et al. (2013) employed a condensed approach, delivering 40 hours of intervention over a two-week period. Similarly, Auclair-Ouellet et al. (2022) administered intervention for four hours per day, three days a week, across four weeks, resulting in a cumulative intervention time of 48 hours. These studies, while employing different intensities, have consistently demonstrated significant improvements in language measures. ICAP participants showed enhanced language and communication assessment scores (e.g., Babbitt et al., 2015; Griffin-Musick et al., 2021), and report psychosocial benefits and increased confidence in social interactions (e.g., Babbitt et al., 2022; Hoover et al., 2017; Nicholas et al., 2021). This underscores the need for further exploration to fully understand the implications of intensity and optimised design within ICAPs.

Apart from uncertainties regarding optimum duration and intensity required to effect change, ICAPs are also considered challenging to implement, with e.g., UK SLTs reporting staffing issues, lack of managerial support, cost implications, and logistical challenges as some of the barriers to delivering ICAPs (Monnelly et al., 2023). In response to these pragmatic constraints Rose et al. (2021) observed the emergence of what they termed "modified ICAP" (mICAP). This term refers to cohort-based programmes that adhere to all ICAP definition elements but feature a modification of one core element. This is usually either intensity or comprehensiveness, whereby alterations to the former were more commonly observed (Rose et al., 2021), suggesting that this ICAP component is more difficult to implement in clinical settings (Griffin-Musick et al., 2024). There is increasing evidence that demonstrates the efficacy of ICAPs, and mICAPs are considered an alternative delivery model that may effect similar changes whilst addressing some of the constraints experienced within clinical settings.

Development of an alternative ICAP format

In 2021, the Royal College of Speech and Language Therapists (RCSLT) led a nationwide initiative aimed at expanding clinical placement availability, addressing a scarcity exacerbated by the impact of the COVID-19 pandemic (RCSLT, 2021). In alignment with this strategy, the University of Strathclyde introduced an online ICAP to offer students an in-house placement opportunity, thus structuring the ICAP within its pre-existing placement framework. This necessitated restricting the overall duration of the study to a maximum of

20 days, encompassing both pre- and post-ICAP activities, including assessment procedures. The ICAP structure was carefully designed to attain at least the minimum required ICAP intensity (Rose et al., 2013), while also allowing students to adequately prepare their interventions and fulfil essential clinical responsibilities. This included record-keeping and documentation in line with the UK's Health and Care Professions Council standards (2016). Students were encouraged to utilise the Subjective, Objective, Assessment, and Plan format (SOAP; Weed, 1964), a widely adopted method in clinical practice aimed at enhancing communication within care settings (Kettenbach, 1995). As this ICAP served as a student placement, it was undertaken by students, who, under the supervision of qualified clinical educators, conducted all aspects of the ICAP, from the initial assessments to the writing of the final report.

In addition to creating new placement opportunities that enabled students to meet clinical requirements at a time of national and international challenge, the in-house ICAP offered the opportunity to evaluate the efficacy of a student-led ICAP and contribute to the increasing evidence base surrounding ICAPs. As discussed, structural and logistical issues mean that ICAPs can be challenging to implement, emphasising the need for innovative approaches to provide more intensive intervention for persons with aphasia (PwAs). Having students contribute to delivering an ICAP could offer a practical solution to this challenge (Monnelly et al., 2023). Strengthening this view, Griffin-Musick et al (2020, 2021). laid the groundwork for effective incorporation of students into ICAP delivery by demonstrating that a university-run, student-led ICAP significantly improved cognitive-linguistic as well as psychosocial measures for PwAs in eight iterations of ICAP over a six-year period.

Due to the COVID-19 pandemic, the ICAP reported in this study was conducted entirely in an online format, using the videoconferencing platform Zoom. Previous research has demonstrated the viability of telehealth for facilitating student practice-based learning in speech and language therapy (e.g., Finch et al., 2020) as well as a feasible approach for administering aphasia assessment and intervention (e.g., Pitt, Theodoros, Hill, & Russell, 2017a and 2017b; Teti et al., 2023). The online format also allowed participants across Scotland to participate in the ICAP, thereby addressing the accessibility challenge of ICAPs, which can be a significant barrier to equitable participation for people with disabilities who live far from ICAP-providing centres (e.g., Scharp et al., 2024).

In response to the COVID-19 pandemic, the University's Speech and Language Pathology undergraduate programme successfully offered two prior iterations of an ICAP-lite in an online format that allowed students to attain the relevant skills and competencies necessary to graduate (Dougan et al., 2021). The term "lite" referred to the reduced intensity of the programme, aligning with the concept of modified ICAP (mICAP) introduced by Rose et al. (2021). The current study is a continuation of this ICAP programme, designed to fulfil the intensity criteria of a full ICAP across a longer time period, and to allow investigation and quantification of potential changes effected by the programme, thereby contributing to the evolving evidence-base pertaining to ICAP provision.

Aim of the study

This study sought to evaluate the effectiveness of a student-led online ICAP for people with chronic post-stroke aphasia. While the results of the two previously conducted ICAP-

lites led by the University (Dougan et al., 2021) suggest that participating individuals made progress in meeting functional and impairment-based goals as measured by standardised assessment of impairment and psychosocial wellbeing, a comprehensive evaluation of these gains had yet to be conducted.

Specifically, the study sought to establish if the online, student-led ICAP resulted in significant gains for people with chronic post-stroke aphasia on:

- impairment-based measures of language functioning
- functional measures of communication
- psychosocial measures of communication participation and QoL

In addition, the study sought to determine whether following the ICAP, the primary communication partners of the participating persons with chronic post-stroke aphasia perceived changes in communication competence in their partners.

Method

Ethical approval to conduct the study was granted by the University Ethics Committee. The study complied with all relevant ethical regulations including seeking informed consent and maintaining confidentiality in relation to data capture and storage.

Study design

Our study reports the results of an ICAP as we designed the study carefully within the parameters of the student placement (cf. section ICAP schedule) to include all elements of an ICAP in terms of intensity and comprehensiveness (Rose et al., 2013). It is worthwhile highlighting that we carefully considered how best to include the educational component. Carer/family feedback from previous iterations of the ICAP queried the education component for PwA/family in the chronic stage of their stroke and aphasia journey, which aligns with Monnelly et al. (2022) observations. For this reason, the focus of the education component of this ICAP was to provide specific information for PwA and their family/carers on therapy approaches used. Specifically, when introducing a new intervention approach in individual as well as group sessions, students provided an overview regarding the rationale as well as evidence base for each approach. Family/carers were invited and encouraged to participate in the ICAP, provided the PwA consented.

Participant recruitment

Participants were recruited in partnership with a local charity that supports stroke survivors using purposive sampling. There were no costs associated with participating in the ICAP. Charity community coordinators were provided with information on the study and identified potential participants meeting the following criteria: adult stroke survivor living in Scotland with stroke-induced chronic aphasia, i.e., stroke occurred >6 months ago, and a severity profile of mild-moderate aphasia in order to facilitate group work. Consequently, no participants with severe aphasia were referred. Participants were further required to speak English as their main language, have cognitive functioning that would

allow participation in the intensive programme, have not previously participated in an ICAP, and to be able to access online interventions independently or with support. Following referrals, a language screening was conducted with fourteen individuals to determine their suitability for the study (cf. "Participant section" below). Twelve persons with chronic aphasia were included in the study, of which one later dropped out for personal reasons. The characteristics of the eleven participants are described in the next section.

Participants

Of the eleven-participating PwAs six were females, and five were males (cf. Table 1). They were aged between 47 and 82. Time post onset varied between six and 42 months. All participants reported English as both their primary language and the language used in their everyday lives. The participants resided in various parts across Scotland, as the ICAP, including the assessment days, was conducted exclusively online. PwA1 had concomitant apraxia of speech. He was included in the study and received tailored intervention that addressed concerns related to both his aphasia and apraxia of speech. This paper reports on his aphasia results only. For the duration of the ICAP, the participants did not engage with other speech and language therapy services.

The Brisbane Evidence-Based Language Test (Brisbane EBLT, Rohde et al., 2020) was used to assess PwAs' language abilities. Six participants were classed as having mild aphasia (group A), and the remaining five PwA had moderate aphasia (group B). To determine the aphasia severity, a consensus approach was employed involving both participating practice educators (PEs) and the academic staff member (cf. "Students and practice educators" section). Students participated in this discussion as a learning opportunity.

Students and practice educators

An academic staff member, who is also a practising SLT, was responsible for overseeing the clinic and ensuring the smooth running of the project. The ICAP was conducted by eight 4th-year speech and language therapy students under the supervision of two

Table 1. Participants' characteristics including age, gender, time post onset and group (A = mild aphasia, B = moderate aphasia).

Participant	Age (in years)	Gender	Time post onset (in months)	ICAP group
PwA1	64	male	6	A
PwA2	51	female	7	A
PwA3	51	male	10	A
PwA4	62	male	14	A
PwA5	59	female	23	A
PwA6	59	male	12	A
PwA7	52	female	19	B
PwA8	75	female	42	B
PwA9	62	female	7	B
PwA10	47	male	11	B
PwA11	82	female	10	B
	Mean: 60.4		Mean: 14.6	

Abbreviations: PwA – Person with Aphasia.

qualified SLTs who specialised in the care of post-stroke aphasia. The PE were employed for two days a week over a 10-week period to support the students during both assessment and ICAP weeks. Their employment constituted the sole cost associated with the ICAP. The Practice Educators (PEs) supervised four students each and were responsible for providing feedback to students and evaluating students' performance.

Four students worked with the PwAs in group A, and four with the PwAs in group B. Each student was responsible for the comprehensive care of one PwA, which entailed guiding them through joint goal setting, preparing session plans, delivering intervention sessions, facilitating communication, and writing a final report. Additionally, the students were paired up to work with an additional PwA and share the responsibility over their care. This arrangement meant that each student was responsible for one PwA individually and one in collaboration with another student.

Assessment procedures

At the start of the ICAP, participants underwent a comprehensive battery of standardised language and communication assessments to obtain baseline measurement data. All assessments were conducted online, with adaptations made where necessary to accommodate the virtual format. Visual stimuli or components required for assessment were presented in a PowerPoint format, with clear numerical signifiers, enabling the PwA to see the stimuli and verbally communicate their responses. For written assessments, participants typed their answers directly into the Zoom chat. The following tests were administered over a two-day period to minimise fatigue:

Day 1

- Subtests from the Comprehensive Aphasia Test (CAT, Swinburn et al., 2004) (semantic memory, verbal fluency, comprehension of spoken words, sentences and paragraphs (auditory comprehension), comprehension of written words and sentences (reading comprehension), naming objects and actions, and writing words subtests)

Day 2

- Subtests from the Communication Activities of Daily Living – Second Edition (CADL-2; Holland, Frattalli & Fromm, 1999) (reading comprehension, functional communication)
- Aphasia Impact Questionnaire-21 (AIQ-21; Swinburn et al., 2018)
- Assessment for Living with Aphasia (ALA; Kagan et al., 2013)

The same assessments were administered again in the same format over two days following the completion of the ICAP to measure potential changes in language and communication outcomes. Both pre- and post-ICAP assessments were conducted by the students under PE supervision. To minimise assessment bias, a cross-assessment approach was implemented. Students working with group B were responsible for assessing the participants in group A, and vice versa. The students conducted pre- and post-

ICAP assessments on the same participants. However, during the post-ICAP assessment, they were no longer able to access the participants' pre-ICAP scores.

As part of the assessment, the participants' communication partners were asked to complete the Carer COAST (Communication Outcomes After Stroke Scale; Long et al., 2009) questionnaire before and after intervention, rating the participants' communication effectiveness and competence, and the impact of the communication changes on their own life. The questionnaire was administered via a phone call by the academic staff member responsible for overseeing the study and who was not involved in assessment or intervention delivery.

At the end of the ICAP, participants were also individually interviewed to gather insights on their expectations, online intervention experiences, intervention impact, and collaboration with other PwAs. The interview results will be reported separately.

ICAP schedule

The ICAP was implemented as a component of the 4th year students' final placement. The placement spanned a duration of ten weeks, with sessions conducted twice a week (cf. Figure 1). In the first two weeks referred participants were screened, assessed and individual intervention goals were established with support from the students. Based on this, intervention plans were developed that incorporated both impairment-based and functional approaches to intervention in line with ICAP guidelines (Rose et al., 2013). The following six weeks represented the ICAP intervention phase, during which the participants actively engaged in therapeutic activities. The concluding two weeks of the 10-week period involved reassessing participants, reviewing individual goals, and engaging in one-on-one discussions with each participant regarding their outcomes and experiences during the programme. A final session, involving all participants and staff members,

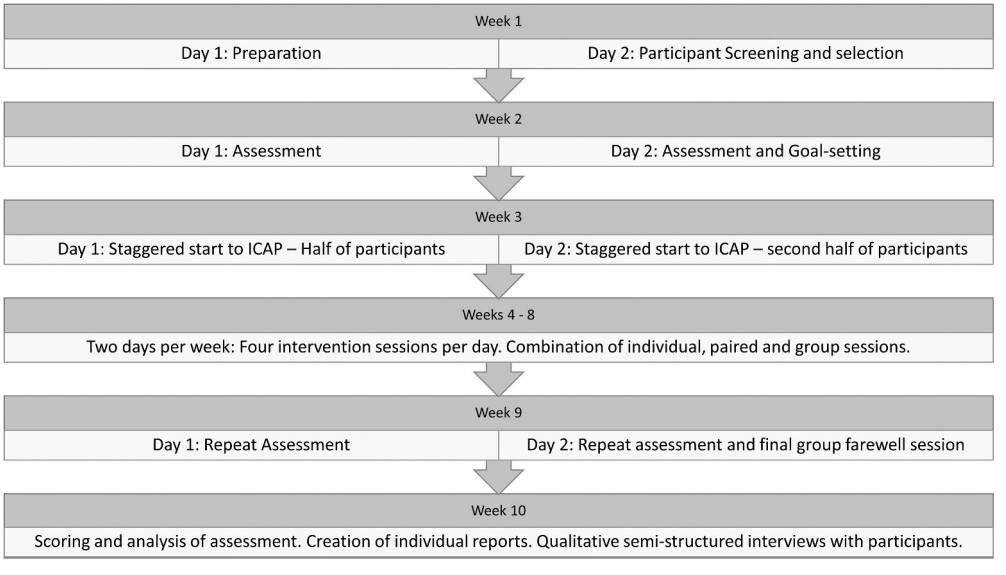

Figure 1. ICAP schedule aligned with 10-week placement schedule.

was organised to conclude the ICAP, celebrate its achievements, and acknowledge the new relationships fostered through the programme. In total, participants received 36 hours of intervention over the six-week period.

ICAP intervention

The ICAP intervention was carried out over six weeks, with two intervention days per week. The language of treatment was English. Each day consisted of four 45-minute sessions. Of these, one was an individual session and three were group sessions. The overall ICAP timetable was designed to ensure that all PwA participated in the same number of group and individual sessions. The group sessions varied in size, ranging from two to six participants, all from the same group. The daily timetable was designed such to allow participants to engage with different peers, providing opportunities to practise their communication skills in diverse scenarios of varying complexity. This approach aligned with participants' functional goals, which centered around improving their ability to participate in social life. The changing group composition also contributed to creating more dynamic sessions.

The content of the sessions and the specific intervention techniques were determined based on the needs and goals of the participants. The one-to-one sessions were tailored to each participant's specific goals, combining evidence-based therapeutic methods with the practice of functional strategies. The group sessions provided a platform for participants to practise their social communication skills and apply strategies learned during individual sessions, while also introducing new techniques. As a result, interventions and schedules varied for each participant. To exemplify this, Appendix A provides a detailed account of PwA2's goals as well as intervention approaches used in individual and group sessions to achieve these goals. The appendix also details a timetable for one week of the ICAP.

Technology aspects

The PwAs used their own devices to join the sessions. One PwA received support from a family member to set up the laptop and Zoom call at the beginning and end of the ICAP days. The Zoom call was configured with an embedded password, and the link remained the same throughout the ICAP to facilitate access and minimise technical issues.

PEs and students joined the call at 09:00 to prepare and plan for the day. At 10:00, the PwAs joined the virtual waiting room before being admitted to the main room. They were admitted as they arrived and greeted by the students to reduce waiting time. On a rotating basis, students assumed the role of "Daily Leader". This role involved quickly explaining the day's plan, reviewing technology aspects, setting up breakout rooms, and sending everyone to their respective rooms. After each session, all participants reconvened in the main room, and during breaks, everyone switched off their cameras and microphones to allow privacy.

Data analysis

Sample size varies for each outcome measure as not all 11 PwAs completed all outcome measures before and after the ICAP due to either participant fatigue or participants asking

Table 2. Individual pre- and post- ICAP assessment scores for the CAT (Improvements between time points are shaded in grey), and group mean and standard deviation for each administered subtest with level of significance, Z value and effect sizes (significant results are in bold).

	semantic memory		verbal fluency		auditory comprehension		reading comprehension		naming actions		naming objects		writing single words	
	pre	post	pre	post	pre	post	pre	post	pre	post	pre	post	pre	post
PwA1	60	60	70	69	63	63	73	73	59	69	53	53	67	67
PwA2	60	60	68	67	60	61	60	68	69	69	74	74	67	67
PwA3	60	60	62	64	63	60	65	73	63	59	64	66	56	67
PwA4	60	60	72	70	59	62	65	68	59	69	60	64	56	67
PwA5	60	60	56	51	54	54	50	57	49	47	52	53	53	60
PwA6	60	60	61	66	60	61	58	62	52	59	61	66	67	67
PwA7	60	60	59	54	54	58	53	57	54	50	59	62	67	67
PwA8	51	60	59	52	40	45	41	46	50	56	54	61	u.t.c.	u.t.c
PwA9	60	60	49	51	41	61	43	49	50	59	51	62	n.a.	n.a.
PwA10	60	60	63	75	37	50	42	50	46	54	58	62	58	60
PwA11	60	60	43	49	36	53	25	51	50	50	47	51	n.a	n.a
mean	59.18	60.00	60.18	60.73	51.55	57.09	52.27	59.45	54.64	58.27	57.55	61.27	61.38	65.25
stdev	2.71	0.00	8.66	9.40	10.82	5.80	13.84	9.91	7.02	7.96	7.42	6.77	6.16	3.24
p	.317		.858		**.024**		**.005**		.050		**.007**		.066	
Z	−1.000		−.179		−2.255		−2.812		−1.958		−2.675		−1.841	
Effect sizes	.30		.05		.68		.85		.59		.81		.65	

Abbreviations: PwA – Person with Aphasia; CAT – Comprehensive Aphasia Test; u.t.c – unable to complete; n.a. PwA asked not to be assessed i.e., not assessed.

not to be assessed. Specifically, the CAT subtest *writing single words* was completed by eight PwAs; the ALA was completed by ten PwAs. In addition, four carers did not complete the Carer COAST, either pre- or post-ICAP, leading to the data of seven carers being included in the analysis (cf. Table 2 and 3 in the Results section).

Pre- and post-intervention assessment data was compared at group level using Wilcoxon signed-rank tests (SPSS, version 28, IBM Corp) to evaluate significant change between pre- and post-intervention performance of the related samples. The level of significance was set at 0.05. Non-parametric tests were employed due to the small sample size and the fact that the data was not normally distributed. In addition, effect sizes (r) were calculated by dividing the Z statistic by the square root of the number of observations (n) (Pallant, 2007), and interpreted using Sawilowsky's (2009) revised benchmarks (.01 = very small; .2 = small; .5 = medium; .8 = large).

Results

Individual and group scores (mean and standard deviation) of the assessments administered pre- and post-ICAP are displayed in Tables 2 and 3, whereby Table 2 reports the results for the CAT subtests, and Table 3 the results of the remaining tests. Both tables further show the statistical results including Z scores and *p* values as well as effect sizes.

Results from the pre- and post-ICAP administration of the CAT subtests used to assess language functioning from an impairment-based perspective show significantly improved group performance for some of the subtests post-intervention. Statistically significant gains were observed for the CAT subtests of *auditory comprehension* and *reading comprehension* (cf. Table 2). The effect sizes for these pre-post-intervention changes were $r = .68$ and $r = .85$, respectively, indicating medium and large effects (Sawilowsky, 2009).

Table 3. Individual pre- and post- ICAP assessment scores for the CADL-2, ALA, AIQ-21 and Carer COAST (Improvements between time points are shaded in grey), and group mean and standard deviation for each administered test with level of significance, Z value and effect sizes (significant results are in bold).

	CADL-2		ALA		AIQ-21		Carer COAST	
	pre	post	pre	post	pre	post	pre	post
PwA1	24	24	87	86	24	24	45	43
PwA2	24	24	80	129.5	34	13	52	59
PwA3	24	24	109	109.5	20	22	40	60
PwA4	24	24	97.5	102	30	31	44	60
PwA5	19	16	95	102	35	30	40	50
PwA6	24	24	72	110.5	37	35	27	43
PwA7	23	23	99	101	23	22	n.c.	n.c.
PwA8	16	21	39	51	47	32	n.c.	n.c
PwA9	15	20	u.t.c.	u.t.c	33	29	35	47
PwA10	17	24	61	46	41	37	44	n.c
PwA11	20	19	109	112	33	28	n.c.	n.c.
mean	20.91	22.09	84.85	94.95	32.45	27.55	40.88	51.71
stdev	3.62	2.74	22.35	26.84	7.98	6.86	7.45	7.83
p	.223		.074		**.021**		**.028**	
Z	−1.219		−1.784		−2.299		−2.201	
Effect sizes	.37		.56		.69		.83	

Abbreviations: CADL-2 - Communication Activities of Daily Living; ALA – Assessment for Living with Aphasia; AIQ-21 - Aphasia Impact Questionnaire, Carer COAST – Communication Outcomes after Stroke Scale; n.c. - not completed; u.t.c – unable to complete.

A significant improvement was also seen in the *object naming* subtest. The effect size for the difference was $r = .81$, which is a large effect (cf. Table 2). The analysis of the CAT subtests assessing *verbal fluency*, *semantic memory, naming actions* and *writing single words* did not reveal a significant change following the intervention (cf. Table 2).

Performance on communication participation and QoL measured using the AIQ-21 revealed significant improvements in the pre- and post-intervention scores, with a medium effect size of $r = .69$. As can be seen from Table 3, no significant differences between scores before and after intervention were observed for the ALA. Analysis of the pre- and post-intervention performance on the CADL-2 as a measure of functional communication did not indicate a significant difference between time points either. In contrast, the Carer COAST, employed as a measure of PwAs' communication effectiveness from the carer's point of view and assessing the impact of PwAs' participation in ICAP on carers' QoL, showed significant differences, suggesting a positive effect of the intervention. The effect size for the observed change was $r = .83$, which is considered large.

Discussion

With ICAPs increasingly being considered a key approach for high intensity aphasia rehabilitation, the current study sought to establish whether a student-led online ICAP delivered for a total of 36 hours resulted in measurable improvements in language, functional communication and QoL for people with chronic aphasia. Significant gains in impairment-based measures were observed for auditory and reading comprehension as well as naming objects. Significant improvements were also observed for the AIQ-21 and the Carer COAST results. In contrast, CADL-2 and ALA scores did not change significantly as a result of participating in the

programme. Our study results indicate that this student-led ICAP effectively enhanced certain aspects of the participants' language and functional communication abilities, as well as aspects of QoL for both PwAs and their communication partners.

Improvements in comprehension

The significant improvements in auditory and reading comprehension observed in our study contribute to the growing body of evidence supporting the notion that ICAP participation can result in significant gains in comprehension for individuals with chronic aphasia (e.g., Babbitt et al., 2015; Griffin-Musick et al., 2021; Leff et al., 2021). The existing studies vary considerably regarding the number of intervention hours delivered. For example, Babbitt et al. (2015) reported significant comprehension gains following 114 hours of intervention and Leff et al. (2021) observed significant improvements after 90 hours. Interestingly, a study by Auclair-Ouellet et al. (2022), in which PwAs received 48 hours of intervention, a figure more closely aligned with the current study's intervention delivery, did not yield significant gains in comprehension. This reinforces the need for a discussion as to the minimum level of intervention hours needed to effect changes in PwAs' comprehension levels. A recent study by Brady et al. (2022) suggests that mixed expressive-receptive approaches delivered for up to 50 hours were associated with the most significant overall improvements. In our study, participants received 36 hours of intervention. Whilst this number sits at the lower end of intervention hours delivered as part of an ICAP, the total dosage fits within Brady et al. (2022) recommendations, thereby suggesting that a condensed and focused therapeutic schedule at a lower ICAP dosage end can lead to notable gains in specific language domains.

However, despite the significant improvements seen in comprehension, not all domains assessed as part of this ICAP showed significant improvements. This suggests that the overall number of intervention hours of an ICAP is an important factor when evaluating findings, but it is unlikely to be the only determinant of treatment efficacy. The impact of other factors such as intervention tailoring needs to be considered for a comprehensive understanding of the observed variation in outcome. Importantly, Brady et al. (2022) found that language gains were more substantial when interventions were functionally tailored, especially for overall language ability and naming. In our ICAP, participants received individualised, person-centred interventions that aligned with their communication goals. This does not seem to always be the case, as Rose et al. (2013) found that only six out of 12 of the ICAPs they investigated had based their intervention on individualised treatment goals. Treatment customisation is known to have positive outcomes for intervention (Thiessen & Brown, 2021), and is therefore likely to have contributed to the significant improvements observed for some of the impairment-based outcome measures, even though it may be difficult to quantify the relative contribution. In addition to treatment customisation, focus has also shifted to the delivery context and session content in an effort to better understand variation in ICAP outcomes. Griffin-Musick et al. (2024) found that ICAP studies generally focus on overall treatment dose but rarely provide detailed information on within-session dose. The authors suggest that more information on the active ingredients and treatment activities of the sessions will be useful when evaluating participant outcomes but acknowledge that in-vivo

recording of data may be challenging. Videorecording ICAP sessions using a multiple single case study approach may be an option to gather this data in future studies.

Improvements in naming

A consistent theme across previous ICAP studies is the programme's efficacy for improving naming abilities. Significant gains in naming skills, measured using the Boston Naming Test (BNT, Kaplan et al., 2001), were reported by Auclair-Ouellet et al. (2022), Babbitt et al. (2015), Rodriguez et al. (2013) and Griffin-Musick et al. (2021). Rodriguez et al. (2013) additionally used the CAT *object naming* subtest to assess change in naming abilities, but in contrast to the BNT results, group analysis of the CAT scores did not show significant improvements in confrontation object naming. Closer inspection of the Rodriguez et al. (2013) data revealed that severity may play a role, as the more severely affected PwAs made little to no gains. According to Rodriguez et al. (2013), nature and severity of the PwAs' language difficulties may have meant that the intervention focused more heavily on aspects other than word retrieval. For this reason, confrontation naming as an outcome measure may not have captured the full picture of intervention-related gains in this group of PwAs (Rodriguez et al., 2013). In our study, the CAT *object naming* subtest was also employed as an impairment-related outcome measure, but in contrast to Rodriguez et al. (2013) findings, we observed a significant improvement at group level post-intervention, with nine out of 11 participants improving and the scores of two PwAs remaining the same across time points. It is possible that the severity profile of our participants may account for the differing findings. Our participants were diagnosed with either mild or moderate aphasia, which means that intervention was more likely to target higher level linguistic aspects including word retrieval.

At the same time, we did not observe a significant improvement in *naming actions*. Treatment items for word retrieval work in previous studies focussing on e.g., Semantic Feature Analysis (SFA) have primarily been nouns (Kristensson et al., 2022), and it is possible that, overall, our study focused more heavily on treating nouns as well. As indicated above, this underscores the need to look more closely at within-session dose in addition to overall treatment dose (Griffin-Musick et al., 2024), e.g., recording number of nouns and verbs targeted and treated per session, to fully understand how number and choice of treatment items in individual as well as group sessions impact participant outcomes.

Having said this, it is also important to mention that the CAT naming object test is based on 24 items, whereas the CAT action naming test features five verbs. This indicates that the test items were not balanced in terms of number of items, and reinforces the importance of carefully selecting outcome measures to effectively measure change.

Changes to functional communication and QoL

Subtests of the CADL-2 were administered in our study to measure performance-based functional communication for people with chronic post-stroke aphasia. The change score between the pre- and post-intervention was not statistically significant, indicating that no improvements were observed at group-level in terms of functional communication. In terms of individual performance, we observed that five of the eleven participants

performed at ceiling in the pre-treatment assessment of the CADL-2, which to some extent might explain the lack of significant change in our study. Individual data revealed that all five participants belonged to the mild aphasia group. This suggests that the change in the CADL-2 post-treatment scores were driven by improvements seen in the group with moderate aphasia. Looking at this group, three of the five PwA scored higher following intervention, performance of one PwA was unchanged, and one PwA scored lower post-treatment. These mixed performance results reflect findings from the only other study to use the CADL-2, in which 51% of ICAP participants showed a clinically significant change in terms of functional communication (Persad et al., 2013). In their data, Persad et al. (2013) observed that pre-treatment severity of aphasia was highly correlated with CADL-2 change scores, with PwAs with more severe aphasia at the start of the programme showing greater gains in functional communication. The mixed results we see in the CADL-2 results can neither confirm nor refute this observation. The ceiling effects we observed in our data indicate though that in particular for participants with mild aphasia alternative outcome measures should be considered in future studies. A number of previously reported ICAP studies employed The Communicative Effectiveness Index (CETI, Lomas et al., 1989), which measures family member's perceptions of the PwAs' functional communication abilities, and reported significant changes in pre- to post- treatment CETI scores (e.g., Babbitt et al., 2015; Rodriguez et al., 2013). Significant improvements in family-reported functional communication abilities were also reported by Hoover and Carney (2014), who used the American Speech-Language-Hearing Association Functional Assessment of Communication Skills for Adults (ASHA FACS; Paul et al., 2005).

Whilst the performance-based CADL-2 results were not significant, we did observe significant changes between pre- and post-treatment scores when using a self-reported assessment, the AIQ-21, where eight of the 11 PwA reported improvements. This indicates that most of the participants self-perceived positive, functional changes in their communication across the evaluated domains of general communication, participation, reading, writing, and wellbeing. Significant self-reported changes have also been observed in other ICAP studies (e.g., Babbitt et al., 2015; Rodriguez et al., 2013), highlighting the importance of including both performance-based as well as self-reported outcome measures to corroborate findings (Rodriguez et al., 2013). This conclusion is supported by the results we obtained for the Carer COAST, which we employed to determine whether involvement in the ICAP would result in significant functional improvement, as reported by family members. Seven family members completed the Carer COAST pre- and post-intervention, revealing a significant improvement in six PwAs' ability to effectively communicate in daily life with a large effect size. Interestingly, the only family member whose Carer COAST scores showed no significant change was linked to PwA1, who only showed improvement on one of the outcome measures. The limited impairment-based gains of PwA1 may therefore have contributed to the absence of a perceived improvement in their daily communication performance.

At the same time, the ALA scores, used to measure the impact of the ICAP on QoL for the PwAs, did not result in significant gains, mirroring findings by Griffin-Musick et al. (2020) and Rodriguez et al. (2013). The lack of significant change may be due to various factors. Rodriguez et al. (2013) suggest that high expectations during the goal-setting phase of an ICAP may lead to discrepancies between anticipated and actual outcomes,

whilst Griffin-Musick et al. (2020) highlight the fact that the ALA appears more sensitive to long-term changes associated with returning to everyday life than short-term changes linked to ICAP participation. This again highlights the importance of carefully selecting outcome measures that comprehensively quantify changes in all targeted domains, and explore changes in perception by both PwAs and family members at different time points.

Involving students in ICAPs

In addition to the above discussion on the effectiveness of ICAP intervention, this study makes a significant contribution to the ongoing discourse on the implementation of ICAPs. While ICAPs have shown success in traditional rehabilitation settings, their inherent challenges, including staffing issues, lack of managerial support, logistical obstacles (Monnelly et al., 2023; Scharp et al., 2024), and high cost implications (Boyer et al., 2022; Scharp et al., 2024), highlight the need for innovative solutions. Involving students in the delivery of ICAPs has been proposed as a possible and viable solution to these challenges (Monnelly et al., 2023), as evidenced in recent successful ICAP interventions delivered by students (Griffin-Musick et al., 2021; Off et al., 2024). Our study strengthens the argument for student involvement in ICAPs further as with the adoption of a student-led model we observed significant improvements in language abilities, functional communication as well as QoL measures for participants and carers. Our finding therefore enhances the existing evidence base, demonstrating the efficacy of a university-run, student-led ICAP for people with chronic aphasia, and that way addressing some of the reported barriers faced by SLTs (Monnelly et al., 2023). In addition, entrusting students, under the supervision of qualified PEs, with the entire spectrum of ICAP responsibilities, from initial assessments to final report composition, can be considered a viable option to address the scarcity of placement opportunities. As a result, our student-led approach not only provides a viable pragmatic and resource-conscious solution to offering ICAPs, it also opens avenues for the creation of alternative placement opportunities.

Limitations and conclusions

A major limitation of this study is its small sample size, which was primarily determined by the ICAP being student-led, and what could feasibly be undertaken within the placement time frame. A larger cohort would have allowed us to undertake comprehensive comparisons of subgroups or investigate the relationships between a range of measures in greater depth to get a better understanding of the mechanisms behind the observed changes. In addition, our study participants had varying language ability profiles, with some participants performing at ceiling for some of the tests undertaken in the pre-assessment. This may have affected the potential to detect change as a result of participating in the intervention. Further research with a larger cohort is warranted to validate and strengthen the findings of our study.

It is important to notice that, although efforts were made to limit the risk of assessor bias through cross-assessment and restricted access to pre-ICAP scores, assessor blinding was not possible. Consequently, there remains a risk of bias, such as the potential for students to have discussed the assessment outcomes with each other.

We would also like to acknowledge that the data collected regarding participant characteristics does not fully meet the requirements outlined in the recently published consensus-based reporting guidelines for participants' description (Wallace et al., 2022). This was mainly due to the nature of the recruitment pathway used in this ICAP. Future ICAP studies should aim to collect and report data in accordance with current consensus-based guidelines to allow us to fully understand patient profiles and their impact on findings.

In addition, when selecting assessment instruments for the ICAP, our key consideration at the time were learning opportunities for students, which led us to opt for assessments that are commonly used in UK clinical practice. In future studies, it would be useful to adopt the ROMA recommendations for patient outcomes (Wallace et al., 2023, 2019) to ensure consistency and comparability regarding clinical intervention research outcomes.

Despite these limitations, our study evidences that participants with chronic aphasia can show significant gains in language, functional communication abilities and QoL following the participation in an online, student-led ICAP. Our findings therefore add to the growing body of evidence demonstrating the effectiveness of ICAPs in improving the lives of individuals affected by chronic aphasia and their communication partners. Beyond this, our results further support the notion that students' skills and experiences can be a meaningful resource to support ICAP programmes in order to achieve the treatment intensity and comprehensiveness needed to effect change.

Acknowledgements

We would like to thank Chest, Heart and Stroke Scotland for their help with recruitment. We would also like to thank Jemma Dougan for establishing the initial ICAP-lite upon which the current study was built.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

Auclair-Ouellet, N., Tittley, L., & Root, K. (2022). Effect of an intensive comprehensive aphasia program on language and communication in chronic aphasia. *Aphasiology*, *36*(11), 1312–1332. https://doi.org/10.1080/02687038.2021.1959016

Babbitt, E. M., Worrall, L., & Cherney, L. R. (2015). Structure, processes, and retrospective outcomes from an intensive comprehensive aphasia program. *American Journal of Speech-Language Pathology*, *24*(4). https://doi.org/10.1044/2015_ajslp-14-0164

Babbitt, E. M., Worrall, L., & Cherney, L. R. (2022). It's like a lifeboat": Stakeholder perspectives of an intensive comprehensive aphasia program (ICAP). *Aphasiology*, *36*(3), 268–290. https://doi.org/10.1080/02687038.2021.1873905

Boyer, N., Jordan, N., & Cherney, L. R. (2022). Implementation cost analysis of an intensive comprehensive aphasia program. *Archives of Physical Medicine and Rehabilitation*, *103*(7), S215–S221. https://doi.org/10.1016/j.apmr.2020.09.398

Boyle, M., & Coelho, C. A. (1995). Application of semantic feature analysis as an intervention for aphasic dysnomia. *American Journal of Speech-Language Pathology*, *4*(4), 94–98. https://doi.org/10.1044/1058-0360.0404.94

Brady, M. C., Ali, M., VandenBerg, K., Williams, L. J., Williams, L. R., Abo, M., Becker, F., Bowen, A., Brandenburg, C., Breitenstein, C., Bruehl, S., Copland, D. A., Cranfill, T. B., diPietro-Bachmann, M., Enderby, P., Fillingham, J., Galli, F. L., Gandolfi, M., Glize, B., … Wright, H. H. (2022). Dosage, intensity, and frequency of language therapy for aphasia: A systematic review–based, individual participant data network meta-analysis. *Stroke*, *53*(3), 956–967. https://doi.org/10.1161/strokeaha.121.035216

Brady, M. C., Kelly, H., Godwin, J., Enderby, P., & Campbell, P. (2016). Speech and language therapy for aphasia following stroke. *Cochrane Database of Systematic Reviews*, *2016*(6). Art. No.: CD000425. https://doi.org/10.1002/14651858.CD000425.pub4

Døli, H., Helland, T., & Andersen Helland, W. (2017). Self-reported symptoms of anxiety and depression in chronic stroke patients with and without aphasia. *Aphasiology*, *31*(12), 1392–1409. https://doi.org/10.1080/02687038.2017.1280595

Dougan, J., Egan, A., Hay, E., McCarney, S., & Kuschmann, A. (2021). ICAP-lite - a student led intensive aphasia programme using telehealth. *Royal College of Speech and Language Therapists Conference*.

Finch, E., Lethlean, J., Rose, T., Fleming, J., Theodoros, D., Cameron, A., Coleman, A., Copland, D., & McPhail, S. M. (2020). Conversations between people with aphasia and speech pathology students via telepractice: A phase II feasibility study. *International Journal of Language & Communication Disorders*, *55*(1), 43–58. https://doi.org/10.1111/1460-6984.12501

Flowers, H. L., Silver, F. L., Fang, J., Rochon, E., & Martino, R. (2013). The incidence, co-occurrence, and predictors of dysphagia, dysarthria, and aphasia after first-ever acute ischemic stroke. *Journal of Communication Disorders*, *46*(3), 238–248. https://doi.org/10.1016/j.jcomdis.2013.04.001

Griffin-Musick, J.R., Harvey, S., Pierce, J. E., Fahey, D., & Off, C. (2024). The "I" in icaps: Examining treatment intensity under the microscope. *Aphasiology*, 1–29. https://doi.org/10.1080/02687038.2024.2317920

Griffin-Musick, J. R., Jakober, D., Sallay, A., Milman, L., & Off, C. A. (2021). Cognitive-linguistic outcomes from an intensive comprehensive aphasia program implemented by graduate student clinicians. *Aphasiology*, *36*(9), 1015–1029. https://doi.org/10.1080/02687038.2021.1937920

Griffin-Musick, J. R., Off, C. A., Milman, L., Kincheloe, H., & Kozlowski, A. (2020). The impact of a university-based intensive comprehensive aphasia program (ICAP) on psychosocial well-being in stroke survivors with aphasia. *Aphasiology*, *35*(10), 1363–1389. https://doi.org/10.1080/02687038.2020.1814949

Grönberg, A., Henriksson, I., Stenman, M., & Lindgren, A. G. (2022). Incidence of aphasia in Ischemic Stroke. *Neuroepidemiology*, *56*(3), 174–182. https://doi.org/10.1159/000524206

Health and Care Professions Council (HCPC). (2016). *Standards of conduct, performance and ethics*. [online]. https://www.hcpc-uk.org/resources/standards/standards-of-conduct-performance-and-ethics/

Hilari, K. (2011). The impact of stroke: Are people with aphasia different to those without? *Disability and Rehabilitation*, *33*(3), 211–218. https://doi.org/10.3109/09638288.2010.508829

Hilari, K., Byng, S., Lamping, D. L., Smith, S. C., & Northcott, S. (2019). Stroke and aphasia quality of life scale-39 (SAQOL-39): Evaluation of acceptability, reliability, and validity. *Stroke*, *50*(2), 437–442. https://doi.org/10.1161/STROKEAHA.118.023188

Holland, A., Frattalli, C., Fromm, D. (1999). *Communication Activities of Daily lLving (CADL-2)* (2nd ed.).

Hoover, E. L., Caplan, D. N., Waters, G. S., & Carney, A. (2017). Communication and quality of life outcomes from an interprofessional intensive, comprehensive, aphasia program (ICAP. *Topics in Stroke Rehabilitation*, *24*(2), 82–90. https://doi.org/10.1080/10749357.2016.1207147

Hoover, E. L., & Carney, A. (2014). Integrating the iPad into an intensive, comprehensive aphasia program. *Seminars in Speech and Language*, *35*(1), 25–37. https://doi.org/10.1055/s-0033-1362990

Kagan, A., Simmons-Mackie, N., Victor, J. C., Carling Rowland, A., Hoch, J., Huijbregts, M., & Streiner, DL. (2013). *Assessment for Living with Aphasia. (ALA)*. Aphasia Institute.

Kaplan, E. F., Goodglass, H., & Weintraub, S. (2001). *The Boston naming test* (2nd ed.). Lippincott Williams & Wilkins.

Kettenbach, G. (1995). *Writing SOAP notes*. Davis.

Kristensson, J., Saldert, C., Östberg, P., Smith, S. R., Åke, S., & Longoni, F. (2022). Naming vs. non-naming treatment in aphasia in a group setting–a randomized controlled trial. *Journal of Communication Disorders*, *97*, 106215. https://doi.org/10.1016/j.jcomdis.2022.106215

Kurland, J., Wilkins, A. R., & Stokes, P. (2021). Intensive speech and language therapy (SLT) for post-stroke aphasia: An updated systematic review and meta-analysis. *Aphasiology*, *35*(2), 222–251. https://doi.org/10.1080/02687038.2020.1739105

Leff, A. P., Nightingale, S., Gooding, B., Rutter, J., Craven, N., Peart, M., Dunstan, A., Sherman, A., Paget, A., Duncan, M., Davidson, J., Kumar, N., Farrington-Douglas, C., Julien, C., & Crinion, J. T. (2021). Clinical effectiveness of the queen square intensive comprehensive aphasia service for patients with poststroke aphasia. *Stroke*, *52*(10). https://doi.org/10.1161/strokeaha.120.033837

Leonard, C., Rochon, E., & Laird, L. (2008). Treating naming impairments in aphasia: Findings from a phonological components analysis treatment. *Aphasiology*, *22*(9), 923–947. https://doi.org/10.1080/02687030701831474

Lomas, J., Pickard, L., Bester, S., Elbard, H., Finlayson, A., & Zoghaib, C. (1989). The communicative effectiveness index. *Journal of Speech and Hearing Disorders*, *54*(1), 113–124. https://doi.org/10.1044/jshd.5401.113

Long, A., Hesketh, A., & Bowen, A. (2009). Communication outcome after stroke: A new measure of the carer's perspective. *Clinical Rehabilitation*, *23*(9), 846–856. https://doi.org/10.1177/0269215509336055

Monnelly, K., Marshall, J., & Cruice, M. (2021). Intensive comprehensive aphasia programmes: A systematic scoping review and analysis using the tidier checklist for reporting interventions. *Disability and Rehabilitation*, *44*(21), 6471–6496. https://doi.org/10.1080/09638288.2021.1964626

Monnelly, K., Marshall, J., & Cruice, M. (2022). Intensive comprehensive aphasia programmes: A systematic scoping review and analysis using the TIDieR checklist for reporting interventions. *Disability and Rehabilitation*, *44*(21), 6471–6496. https://doi.org/10.1080/09638288.2021.1964626

Monnelly, K., Marshall, J., Dipper, L., & Cruice, M. (2023). Intensive and comprehensive aphasia therapy—a survey of the definitions, practices and views of speech and language therapists in the United Kingdom. *International Journal of Language & Communication Disorders*, *58*(6), 2077–2102. https://doi.org/10.1111/1460-6984.12918

National clinical guideline for stroke for the UK and Ireland. Intercollegiate Stroke Working Party. Retrived 2023 May 4, from www.strokeguideline.org

Nicholas, M., Pittmann, R., Pennington, S., Connor, L. T., Ambrosi, D., Brady Wagner, L., Hildebrand, M., & Savastano, M. (2021). Outcomes of an interprofessional intensive comprehensive aphasia program's first five years. *Topics in Stroke Rehabilitation*, *29*(8), 588–604. https://doi.org/10.1080/10749357.2021.1970452

Off, C. A., Leyhe, A. A., Baylor, C. R., Griffin-Musick, J., & Murray, K. (2024). Patient perspectives of a university-based intensive comprehensive aphasia program for stroke survivors with aphasia. *Aphasiology*, *38*(1), 22–49. https://doi.org/10.1080/02687038.2022.2153327

Osiejuk, E. (1991). Discourse exercises in aphasia therapy: A case study. *Aphasiology*, *5*(4–5), 443–446. https://doi.org/10.1080/02687039108248549

Pallant, J. F. (2007). *SPSS survival manual: A step-by-step guide to data analysis with SPSS*. McGraw Hill.

Palmer, R., Witts, H., Chater, T., & Starrfelt, R. (2018). What speech and language therapy do community dwelling stroke survivors with aphasia receive in the UK? *Public Library of Science ONE*, *13*(7), e0200096. PMID: 29990345; PMCID: PMC6039008. https://doi.org/10.1371/journal.pone.0200096

Paul, D., Holland, A., Frattali, C., & Thompson, C. K. (2005). *Quality of Communication Life Scales (QCL)*. American Speech-Language-Hearing Association.

Persad, C., Wozniak, L., & Kostopoulos, E. (2013). Retrospective analysis of outcomes from two intensive comprehensive aphasia programs. *Topics in Stroke Rehabilitation*, *20*(5), 388–397. https://doi.org/10.1310/tsr2005-388

Pitt, R., Theodoros, D., Hill, A. J., Rodriguez, A. D., & Russell, T. (2017). The feasibility of delivering constraint-induced language therapy via the internet. *Digital Health*, *3*, 205520761771876. https://doi.org/10.1177/2055207617718767

Pitt, R., Theodoros, D., Hill, A. J., & Russell, T. (2017). The development and feasibility of an online aphasia group intervention and networking program – TeleGAIN. *International Journal of Speech-Language Pathology*, *21*(1), 23–36. https://doi.org/10.1080/17549507.2017.1369567

Public Health Scotland. (2021). *Scottish stroke improvement programme 2021 - national report*. https://publichealthscotland.scot/publications/scottish-stroke-improvement-programme/scottish-stroke-improvement-programme-2021-national-report/

Rodriguez, A. D., Worrall, L., Brown, K., Grohn, B., McKinnon, E., Pearson, C., Van Hees, S., Roxbury, T., Cornwell, P., MacDonald, A., Angwin, A., Cardell, E., Davidson, B., & Copland, D. A. (2013). Aphasia LIFT: Exploratory investigation of an intensive comprehensive aphasia programme. *Aphasiology*, *27*(11), 1339–1361. https://doi.org/10.1080/02687038.2013.825759

Rohde, A., Doi, S. A., Worrall, L., Godecke, E., Farrell, A., O'Halloran, R., McCracken, M., Lawson, N., Cremer, R., & Wong, A. (2020). Development and diagnostic validation of the Brisbane evidence-based language test. *Disability and Rehabilitation*, *44*(4), 625–636. https://doi.org/10.1080/09638288.2020.1773547

Rose, M. L., Cherney, L. R., & Worrall, L. E. (2013). Intensive comprehensive aphasia programs: An international survey of practice. *Topics in Stroke Rehabilitation*, *20*(5), 379–387. https://doi.org/10.1310/tsr2005-379

Rose, M. L., Pierce, J. E., Scharp, V. L., Off, C. A., Babbitt, E. M., Griffin-Musick, J. R., & Cherney, L. R. (2021). Developments in the application of intensive comprehensive aphasia programs: An international survey of practice. *Disability and Rehabilitation*, *44*(20), 5863–5877. https://doi.org/10.1080/09638288.2021.1948621

Royal College of Speech and Language Therapists (RCSLT). (2021). *RCSLT placement expansion and innovation campaign*. [online]. https://www.rcslt.org/members/lifelong-learning/practice-based-learning/placements-campaign/

Sawilowsky, S. S. (2009). New effect size rules of thumb. *Journal of Modern Applied Statistical Methods*, *8*(2), 597–599. https://doi.org/10.22237/jmasm/1257035100

Scharp, V. L., Off, C. A., Wilson, M., & Roberts, K. J. (2024). Research gaps in intensive comprehensive aphasia programs: A qualitative study. *Aphasiology*, 1–35. https://doi.org/10.1080/02687038.2024.2315843

Swinburn, K., Best, W., Beeke, S., Cruice, M., Smith, L., Pearce Willis, E., Ledingham, K., Sweeney, J., & McVicker, S. J. (2018). A concise patient reported outcome measure for people with aphasia: The aphasia impact questionnaire 21. *Aphasiology*, *33*(9), 1035–1060. https://doi.org/10.1080/02687038.2018.1517406

Swinburn, K., Porter, G., & Howard, D. (2004). *Comprehensive aphasia test*. Psychology Press.

Teti, S., Murray, L. L., Orange, J. B., Page, A. D., & Kankam, K. S. (2023). Telehealth assessments and interventions for individuals with poststroke aphasia: A scoping review. *American Journal of Speech-Language Pathology*, *32*(3), 1360–1375. https://doi.org/10.1044/2023_ajslp-22-00324

Thiessen, A., & Brown, J. (2021). Personalization of restorative and compensatory treatments for people with aphasia. *Topics in Language Disorders*, *41*(3), 269–281. https://doi.org/10.1097/tld.0000000000000253

Trebilcock, M., Worrall, L., Ryan, B., Shrubsole, K., Jagoe, C., Simmons-Mackie, N., Bright, F., Cruice, M., Pritchard, M., & Le Dorze, G. (2019). Increasing the intensity and comprehensiveness of aphasia services: Identification of key factors influencing implementation across six countries. *Aphasiology*, *33*(7), 865–887. https://doi.org/10.1080/02687038.2019.1602860

Wallace, S. J., Isaacs, M., Ali, M., & Brady, M. C. (2022). Establishing reporting standards for participant characteristics in post-stroke aphasia research: An international e-delphi exercise and consensus meeting. *Clinical Rehabilitation*, *37*(2), 199–214. https://doi.org/10.1177/02692155221131241

Wallace, S.J., Worrall, L., Rose, T., Alyahya, R., Babbitt, E., Beeke, S., de Beer, C., Bose, A., Bowen, A., Brady, M., Breitenstein, C., Bruehl, S., Bryant, L., Ross, B., Cherney, L., Conroy, P., Copland, D., Croteau, C. , and Whitworth, A. (2023). Measuring communication as a core outcome in aphasia trials: Results of the ROMA-2 international core outcome set development meeting. *International*

Journal of Language & Communication Disorders, *58*(4), 1017–1028. https://doi.org/10.1111/1460-6984.12840

Wallace, S. J., Worrall, L., Rose, T., Le Dorze, G., Breitenstein, C., Hilari, K., Babbitt, E., Bose, A., Brady, M., Cherney, L. R., Copland, D., Cruice, M., Enderby, P., Hersh, D., Howe, T., Kelly, H., Kiran, S., Laska, A. C., … Webster, J. (2019). A core outcome set for aphasia treatment research: The ROMA consensus statement. *International Journal of Stroke*, *14*(2), 180–185. https://doi.org/10.1177/1747493018806200

Wambaugh, J. L., Nessler, C., & Wright, S. (2013). Modified response elaboration training: Application to procedural discourse and personal recounts. *American Journal of Speech-Language Pathology*, *22*(2). https://doi.org/10.1044/1058-0360(2013/12-0063)

Weed, L. L. (1964). Medical records, patient care, and medical education. *Irish Journal of Medical Science*, *39*(6), 271–282. https://doi.org/10.1007/bf02945791