

Feasibility and cost analysis of implementing high intensity aphasia clinics within a subacute
setting

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Abstract

The current study explored the clinical feasibility and costs of embedding three different intensive service delivery models for aphasia treatment (computer, group therapy, and therapy with a speech pathology therapy assistant) within three subacute facilities. The study employed a two cohort comparison design, with the first cohort ($n=22$) receiving the standard service of treatment currently offered. This treatment was delivered by a speech-language pathologist and involved on average 3 hrs of treatment/week over 8 weeks. Participants in the second cohort ($n=31$) received one of the three intensive treatment models providing up to 9 hrs of therapy/week for 11 weeks. Organisational data was collected throughout treatment, with participant, caregiver and clinician satisfaction with the intensive models also being measured. Participants completed the spoken language production subtests and the Disability Questionnaire of the Comprehensive Aphasia Test (CAT) pre and post treatment. All intensive models yielded high participant attendance, satisfaction and significant improvements to the CAT subtests. The pro-rata cost of providing treatment per hour per client for the computer and group therapy models was found to be approximately 30% cheaper compared to the standard service. The outcomes support the potential feasibility of embedding the different models into subacute facilities to enhance client access to intensive treatment for aphasia.

Keywords: *cost-analysis, aphasia, intensive treatment*

Introduction

The presence of aphasia not only has a significant negative impact on the quality of life of the individual and their family (Hilari, Needle, & Harrison, 2012) but also can be a significant burden to the healthcare system. Aphasia is associated with increased hospital and rehabilitation stays, increased likelihood of residential care placement, and increased short- and long-term morbidity and mortality (Bersano, Burgio, Gattinoni, & Candelise, 2009; Berthier, 2005; Dickey, Kagan, Lindsay, Fang, & Rowland, 2010; Ellis, Simpson, Bonilha, Mauldin, & Simpson, 2012). Evidence-based speech-language pathology (SLP) interventions should therefore be prioritised within governmental healthcare services to ensure that efficient services with optimal outcomes are provided (Gialanella & Prometti, 2009).

The intensity of treatment is a crucial factor in determining the success of outcomes for individuals with aphasia (Bhogal, Teasell, & Speechley, 2003; Kelly, Brady, & Enderby, 2010; Robey, 1998), with intensive treatment reported to be more effective for the recovery of individuals with aphasia in comparison to a less intensive treatment schedule (Bhogal, et al., 2003; Kelly, et al., 2010; Robey, 1998). Indeed, a meta-analysis by Bhogal et al. (2003) revealed that studies reporting significant treatment effects provided on average 8.8 hours of therapy per week for 11.2 weeks, while studies which revealed non-significant effects on language, involved treatments that were on average 2 hours week for 22.9 weeks. Despite this evidence, current service delivery models for aphasia within subacute facilities, (being goal based, time limited inpatient or outpatient healthcare facilities for conditions of moderate or low acuity Gray, 2002; Levenson, 2000) continue to remain non intensive and use predominately one-on-one individual SLP therapy. Modifying this traditional model to increase therapy intensity (i.e. more direct therapy sessions with a SLP each week) would be resource intensive and inefficient. Hence investigation into the application of different models of care which could supplement traditional therapy services and facilitate increased intensity in a more cost efficient manner is warranted. Within the current literature, there is

evidence to support three alternate service delivery options that could be implemented to facilitate increased intensity of treatment, including: the use of (1) computer technology (2) group therapy, and (3) therapy with a speech pathology therapy assistant (SPTA).

Computers and other technology have the important advantage of allowing individuals to target their language function with minimal assistance from the therapist (Doesborgh et al., 2004; Meike & van de Sandt-koenderman, 2011), thus providing increased intensity of intervention at a reduced cost (Schroder, Schupp, Seewald, & Haase, 2007). Recent review articles affirm that computer assisted treatment can be highly beneficial as an adjunct to individualised clinician-led therapy, being a potentially cost effective means for supplementing the intensity of treatment for people with aphasia (Fink, Brecher, Sobel, & Schwartz, 2005; Wallesch & Johannsen-Horbach, 2004). Group treatment is another effective means to increase the intensity of treatment in aphasia (Antonucci, 2009; Aten, Caligiuri, & Holland, 1982; Brumfitt & Sheeran, 1997; Elman & Bernstein-Ellis, 1999; Fink & Schwartz, 2000; Marshall, 1993; Ross, Winslow, & Marchant, 2006). As well as being more cost effective than individual therapy, group-based intervention can provide communicative opportunities to aphasic individuals that are uniquely different to individual aphasia therapy (Simmons-Mackie, Elman, Holland, & Damico, 2007). The use of a trained SPTA may also increase treatment intensity in a potentially cost-effective manner. Policy documents from the Australian, American, and United Kingdom speech-language pathology associations strongly advocate the use of SPTAs in supporting the management of individuals with communication disorders (American Speech-Language-Hearing Association, 2013; Royal College of Speech Language Therapists, 2009; Speech Pathology Australia, 2007). Although a recent systematic review of allied health assistants revealed a shortage of research exploring the effectiveness of SPTAs, there is increasing evidence supporting the use of allied health assistants in general, including evidence of improved clinical outcomes and increased patient satisfaction (Lizarondo, Kumar, Hyde, & Skidmore, 2010).

Whilst the evidence to support the efficacy of different service delivery options which facilitate increased intensity have been identified in the literature, further investigation into the translation of such models into practice is required. More information about the feasibility of implementing such new models of care within the clinical environment, rather than in research clinics, is required. Insight into the consumer perspective of undergoing intensive treatment models is also needed. Without support from clients, clinicians, as well as the healthcare organisation, implementation of any new model of care will not be sustainable. From an organisational perspective, investigation into the costs of delivering each different service delivery model in the treatment of aphasia is also warranted. Despite the resource intensive nature of aphasia on the healthcare system, a recent Cochrane review of aphasia treatment (Brady, Kelly, Godwin, & Enderby, 2012) reported only one study which included economic analyses (Bowen et al., 2012). Hence, the aim of current study was to evaluate the operational feasibility of implementing three intensive different models of care for people with aphasia: (1) computer therapy; (2) group therapy and (3) SPTA therapy, and to compare the costs compared to current standard service. A secondary aim was to evaluate the clients', clinicians' and caregivers' perceptions of the intensive models in order to evaluate satisfaction and identify barriers and facilitators in applying these models in the clinical setting.

Method

Design

The intensive service delivery models were evaluated in comparison to the standard service using a two cohort comparison study design.

Participants

Three participant groups were recruited for this study: 1) participants with aphasia; 2) caregivers, and; 3) clinicians. Participants with aphasia were recruited from the current

inpatient and outpatient referral lists from the SLP departments of three Queensland government hospitals. All participants presented with aphasia due to a non-progressive neurological aetiology, and were deemed suitable to participate in active rehabilitation by their medical officer. Participants were excluded if they presented with a co-existing moderate to severe cognitive impairment (as determined by their practicing medical officer), were under 18 years of age, presented with a global aphasia whereby they were considered by their treating SLP to be unable to tolerate participation in an intensive treatment schedule, had a diffuse brain damage, or were not considered to be proficient in English prior to the onset of his or her aphasia.

A total of 39 individuals with aphasia participated in the study, ranging in ages between 39 and 88 years, as detailed in table 1. Severity of participants' aphasia (see table 1) was based on pre-treatment ratings performed by the treating SLP using the impairment scale of the standardised Australian Therapy Outcomes Measure for language (AusTOMs, et al., 2004). Recruitment of participants into the two cohorts occurred sequentially. The 22 participants in cohort 1 (standard service) were recruited prospectively from the three hospital sites in the 6 months between June to December 2011. The second cohort consisted of 31 participants prospectively recruited in the 6 months during January 2012 to July 2012. These 31 underwent one of the three intensive treatment models: computer therapy (n=13); group therapy, (n=11), and SPTA therapy (n=7), which were provided in combination with individual therapy. It must be noted that some participants participated in more than one intensive service treatment block, including eight participants who received the standard service later participating also in the intensive model (see table 1).

Planned contrasts (i.e., independent t-tests and Mann-Whitney tests based on the distribution of the data) revealed no-significant differences between groups for age. The computer therapy and SPTA groups were not significantly different in months post onset to the standard service, however the group therapy model showed significantly higher months

post onset than the standard service ($p= 0.031$). Significantly higher years of education for participants receiving SPTA therapy compared to all other models was also found, including standard service ($p=.009$), computer therapy ($p=.002$), and group therapy ($p= .014$).

In the intensive treatment cohort, one participant from the SPTA model formally withdrew after two weeks of treatment and therefore was not included in any analyses. This left data of 22 participants in standard service, 13 participants in computer therapy, 11 participants in group therapy and 6 participants in SPTA therapy. Further information regarding attendance and withdrawals is described in the results section as this was also considered a measure of clinical feasibility in the study.

[insert table 1 near here]

The cohort of caregivers was recruited from the spouses/carers of the participants with aphasia to investigate satisfaction with the intensive service. This included 20 caregivers across the intensive service groups as follows: computer therapy ($n=10$), group therapy ($n=6$) and SPTA therapy ($n=4$). As some of the participants with aphasia participated in more than one treatment block, their respective caregivers subsequently completed more than one questionnaire.

The clinician cohort included all clinicians actively involved in administering the standard and intensive service. A total of 12 SLPs (all female; mean years of experience = 4.3 years, $SD= 3.8$) and one SPTA gave consent to provide formal feedback regarding their perspective of the intensive models in comparison to the standard model. This included five SLPs from the site trialling computer therapy, four SLPs from the site trialling group therapy and three SLPs and one SPTA from the site trialling the SPTA model.

Procedure

Assessments of client outcomes, costs, and consumer satisfaction

In order to evaluate the effect that the different service delivery models had on spoken language, and everyday function and well-being of the clients with aphasia, the i) spoken language production subtests and the ii) Disability Questionnaire of the Comprehensive Aphasia Test (CAT) (Howard, Swinburn, & Porter, 2004) were respectively administered to participants with aphasia before and after treatment. The spoken language production subtests of the CAT include the naming objects, naming actions and word fluency subtests, with the total sum of these three tests' raw score being used in analyses. Further information regarding these subtests can be accessed in the treatment manual (Howard, et al., 2004). The Disability Questionnaire of the CAT is a standardised 28-item aphasia-friendly questionnaire which involves the participant self-reporting on a 4-point Likert scale their perceptions of different areas of their communication and the impact it had on their daily life and emotional well-being. The questionnaire provided a total raw score out of 112, with higher scores indicating a more significant negative impact of aphasia. These two tests were conducted by the treating clinician as part of a larger assessment battery within one week prior to commencing treatment and one week immediately post treatment in accordance with the administration guidelines. For those participants who completed two treatment blocks, the post assessment conducted at the end of their initial treatment block was used as the pre-treatment assessment for the second treatment block unless there was greater than 4 weeks between the two treatment blocks.

As the focus on this paper is on clinical feasibility and costs as opposed to language outcomes, the results of the full language assessments will not be reported here but rather will be disseminated in subsequent publications. It should also be noted that the Disability Questionnaire results were unavailable for five participants from the standard service as a result of unexpected early discharge from the inpatient facility preventing full completion of post treatment assessment or missing data. Results of the Disability Questionnaire are therefore reported for 17 participants from the standard service.

Organisational-based outcomes including the cost of each service were evaluated using a range of data listed in table 2. This data was collected by the treating clinician for each participant and analysed at the end of each therapy block to determine costs of each service. Cost of staffing the standard and intensive service was calculated as the sum of direct SLP (+/- SPTA) intervention hours and the number of indirect planning hours attributable to the client (i.e., preparing session, writing notes) multiplied by the wage rates of the average level of SLP (HP3.4=\$48.02/hr including on costs) and the SPTA (OO3.1 = \$34.69/hr including on costs). These rates were in accordance with current Queensland government pay scales at the time of the study. For the group intervention in the intensive service, direct SLP intervention per client was calculated by dividing the duration of the group session (i.e., 60min) by the number of members attending the group. For example an individual attending a group session with four other members would be calculated to receive 12min of direct therapy (i.e., 60min divided by 5). To calculate the pro-rata cost of providing treatment per hour per client, the total cost of staffing the treatment (as aforementioned) was divided by the number of hours of total therapy the participant received. This value allowed a comparison of what estimated staffing costs were to provide therapy per hour per client using each of the different models.

[insert table 2 near here]

Satisfaction measures were evaluated after the intensive treatment model only and included questionnaires being provided to participants with aphasia, caregivers and clinicians at the end of their participation in the intensive treatment. Items for each of the questionnaires were as follows:

Participant satisfaction. The participant questionnaire consisted of eight items. The first four items used an aphasia-friendly 5-point likert scale and consisted of the following questions: 1) How helpful was the *individual* SLP therapy? 2) How helpful was therapy

with the other model (e.g., computer therapy, group therapy, SPTA therapy)? 3) Overall, how helpful was the treatment, and 4) How tired did the treatment make you feel? A rating of “5” on the likert scale indicated a very positive response (i.e., “very helpful”), a rating of “3” indicated a neutral response (i.e., “unsure”), and a rating of “1” indicated a negative response (e.g., “not at all helpful”). The questionnaire also asked a categorical yes/no question “Would you recommend this treatment to someone else?” The three remaining questions allowed free-form responses regarding what the participants liked most and least about their treatment and what suggestions they had to improve the treatment.

Caregiver satisfaction. The caregiver questionnaire also consisted of eight items, with the first five questions being presented on a 5-point likert scale. These questions included: 1) How useful was the treatment? 2) How tired did it make the person with aphasia feel? 3) How convenient was the treatment? 4) Have you noticed any positive change to your loved one’s well being (e.g., more positive, confident, happier) since they received the treatment? 5) Would you recommend this treatment to someone else with aphasia? The Likert scale was scaled similarly to the aphasia participant questionnaire with a rating of “5” indicating a more favourable/positive response and a rating of “1” indicating a negative response. Additional space for comments pertaining to each of these five questions was also provided in the questionnaire. The last three items of the caregiver questionnaire asked what the caregiver liked most and least about the treatment provided to the person with aphasia and any suggestions they had to improve the service.

Clinician satisfaction. The clinician questionnaire consisted of 10-items with the first seven questions again using a 5-point Likert scale, consisting of the following questions: 1) How useful was the added treatment model (i.e., added computer, group or SPTA therapy)? 2) How easy was it to provide the intensive service compared to the standard service? 3) How much did the intensive service interfere with inpatient appointments? 4) How much did the intensive service interfere with outpatient appointments, 5) How difficult was it to schedule appointments, 6) How confident are you in recommending this treatment model to a person with aphasia, and 7) How confident are you in recommending this model to another

clinician? The three remaining items of the questionnaire allowed free-form responses related to what the clinician thought did and did not work well about the treatment, and suggestions for improvement.

Treatment

Standard Service

The standard service was taken as the service currently being delivered to clients with aphasia at each of three recruitment facilities. The amount of treatment provided in the standard service was on average 3 hours/week for approximately 8 weeks, averaging 3-4 sessions a week and being provided predominately through face to face therapy by a certified SLP. As is standard speech-language pathology practice, therapy provided was individualised according to the participant's unique profile of language impairments. As a result, therapy may have targeted auditory comprehension, reading comprehension, verbal expression and/or written expression in order to maximise functional communication using psycholinguistic based principles.

Intensive Treatment

Treatment provided to participants in the intensive treatment cohort was delivered using one of the three different models. All participants in the intensive cohort were provided with a total of approximately 9 hours of treatment per week over an 11 week treatment block. Some minor variation in total number of hours received was evident across the groups which can be attributed to variation in participant attendance between models. Over the course of the study, two treatment blocks were delivered. During each block, treatment was provided over four to five days a week. Each day comprised of a one hour session of individual treatment by a certified SLP (using the same techniques as the standard service cohort) and an additional one to one and a half hours of treatment employing either the use of (a) computer therapy, (b) group therapy or (c) SPTA therapy as described:

a) *Computer therapy.* Computer based therapy used a range of software programmes including REACT-2, Aphasia Tutor, Language Links, and Synonyms, Homonyms, and Antonyms in order to target individual language goals. Computer therapy was supervised by a SLP with up to three participants simultaneously receiving treatment on their own individual computer within a clinic room.

b) *Group therapy.*

Four to six participants participated in each group therapy session which was facilitated by a SLP. Sessions focused on improving the participant's language impairment and communication goals through semantic based, naming, verbal explanation and functional communication tasks. Each session involved a specific thematic topic found to be relevant to everyday life (e.g., food, family, pets, shopping).

b) *Speech pathology therapy assistants.*

The tasks provided by the SPTA were planned by the treating SLP and reflected similar tasks that participants received during their individual SLP therapy (e.g., the use of specific worksheets). The SPTA provided verbal and written feedback to the SLP regarding the participant's performance after each session.

Statistical Analysis

The degree of change to the CAT subtests following each treatment within each group, were analysed using either paired t-tests or Wilcoxon signed rank tests (depending on whether normality was upheld), using IBM Statistical Package for the Social Sciences (version 20). To determine whether any significant differences occurred between groups following treatment, the mean difference scores from pre to post-treatment were used and analysed using a one-way ANOVA (as data was found to be normally distributed) with post hoc analyses being performed as required. For all statistical analysis, $p < 0.05$ was used to indicate significance. Organisational outcomes and responses on the likert scale of the

satisfaction questionnaires were analysed using descriptive statistics. Free-form items of the satisfaction questionnaires were analysed qualitatively with key themes being identified.

Results

Client outcomes

All three intensive models as well as the standard service, demonstrated statistically significant improvements between pre- and post treatment on the spoken language production subtests. Between group analyses did not reveal a significant main effect for group ($F(3,46)=0.694$, $p=0.560$), indicating no significant differences between the groups for this measure. All three intensive treatment models demonstrated statistically significant improvements between pre- and post-treatment on the Disability Questionnaire, as shown in table 3. No statistically significant within group changes were found pre-post treatment for the standard service. Between group analyses did not reveal a significant main effect for group ($F(3,46)=1.869$, $p=0.149$), indicating no significant differences between the groups for this measure.

[insert table 3 near here]

Cost of Service

The total cost of treatment per client and the pro-rata cost of therapy per hour per client are shown in table 4. While the total cost of treatment provided per client was more expensive for each of the intensive models, the pro-rata cost of treatment per hour per client was considerably less for the computer and group therapy models, with participants receiving more therapy hours per every dollar spent. The pro-rata cost of providing treatment per hour per client for the computer therapy and group therapy intensive service models was demonstrated to be approximately 30% cheaper when compared to the standard service,

being \$41 and \$39 respectively per hour of therapy per client, compared to \$56 per hour of therapy per client for the standard service.

[insert table 4 near here]

Clinical Feasibility

Attendance

Participant attendance was very high for all three intensive treatment models as well as the standard service. Specifically, attendance in the computer therapy group was 93%, group therapy was 89%, SPTA therapy was 99% and participation in the standard service was 93%. A total of two participants formally withdrew from the treatment across the three intensive service models, with overall attrition for the intensive clinic therefore being 6%. The first participant who withdrew participated in the group therapy model (therapy block 1) and reported that the intensive nature of the program and long waiting time between his individual and group therapy left inadequate time for his outside commitments. As this participant took part in over 60% of the treatment block (i.e., seven out of 11 weeks of therapy), this participant's data was still included in the final data analyses. A second participant from the second block of the SPTA model withdrew secondary to physical and mental fatigue associated with the treatment and travel time to the clinic. This participant was elderly and had some mild cognitive impairments which although not severe, still impacted on their ability to participate. As this participant only participated in three out of the 11 weeks of therapy, their data was excluded in final analyses. Although there were no other formal withdrawals, six other participants were unable to complete the entire 11 week block and either commenced the treatment block late or finished early secondary to unforeseen circumstances (i.e., surgery, sickness, discharge to another geographical location). These participants on average completed eight out of the 11 weeks of therapy.

Participant satisfaction

Participants with aphasia reported overall high satisfaction across the three intensive models in relation to helpfulness of therapy (items 1-3 of questionnaire), all being above 4 out of 5.. Participants' ratings of tiredness were on average between "3" and "4" across the groups, falling between the "unsure" and "not very tired" ratings scales. For the question, "Would you recommend the treatment to another person?" 100% of participants in the group therapy and SPTA models, and 92% of participants in the computer therapy group indicated "yes."

Common themes reported by participants for the item about what they liked most about therapy included the social aspect of therapy, which was reported by five participants in the computer therapy model, five participants in the group therapy model and one participant in the SPTA model. Participants across all models also reported the quality of the staff and increased confidence and improvements they saw in themselves as factors they enjoyed about the treatment. Two participants (one in the computer model and one in the SPTA model) also commented that the intensity of therapy was something they enjoyed.

Few participants with aphasia responded to the question, "What didn't you like about therapy?" (n= 4 in computer therapy, n=2 in group therapy and n=1 for SPTA therapy), with the majority of respondents indicating "nothing". Of those that did respond, themes were closely related to their response to the subsequent question regarding suggestions for improvement. Ideas for improvement reported by participants in the computer group included having "individual computer therapy (more support and attention)" and two participants commented having a designated room for computer therapy, as in the present study the room where participants received computer therapy alternated. Suggestions from participants to improve treatment in the group therapy model included having "personal goals (in group as well) such as reading the newspaper" and having therapy "three days a week". Suggestions by participants in the SPTA group included "more chance for conversation" and "maybe include some computer work". Perhaps need to mention again at this point that satisfaction was not measured for clients in the standard treatment group.

Caregiver satisfaction.

Caregiver satisfaction was high across the three intensive models, with mean ratings generally above four out of five for the items relating to usefulness of therapy, convenience, degree of positive change seen, and likeliness of recommending the treatment to another person with aphasia. Caregiver reports of how tired therapy made the person with aphasia were generally higher than what the participant reported. Common themes across the three intensive clinics from the questionnaire item related to what caregivers liked most about the treatment pertained to the quality and dedication of the staff and the increased confidence seen in the person with aphasia. Two caregivers from the computer model and one from the SPTA model also reported the intensity of therapy to be a factor they liked about the service. Only one caregiver from three intensive clinics responded to the item, “What did you not like about treatment”, and three participants responded to the item regarding suggestions for improvement. Responses included one caregiver from the group therapy model suggesting the treatment block “could go longer” and another caregiver from the computer therapy model suggesting resources are more Australian. Another caregiver from the SPTA model also provided some suggestion pertaining to the SPTA’s therapeutic technique stating, “Although the aide’s [SPTA’s] time with X was beneficial, some pre training of the aides would enrich the program, e.g., waiting time before repeating questions.”

Clinician satisfaction.

Clinicians across the three clinics reported high ratings (above four out of five) for items pertaining to usefulness of the extra model, and recommending the model to a person with aphasia and another clinician. While clinicians overall did not report difficulties scheduling appointments or interference with other inpatient and outpatient appointments, they did generally report that it was somewhat more difficult to provide intensive treatment compared to the standard service. The free-form items of the clinician questionnaire identified a number of facilitating factors to the intensive clinics including the social aspect of the therapy that

people with aphasia experienced, increased confidence seen in participants, and increased professional opportunity for development as a clinician. Certain barriers including clinician fatigue and individual factors (i.e., physical stamina, proximity to clinic) impacting on client participation in the intensive treatments were also identified. Further details of clinician perspectives from the questionnaires are reported elsewhere (Walsh et al., 2012).

Discussion

The current study explored the feasibility and staffing costs associated with embedding three service delivery models which facilitate increased intensity of aphasia treatment relative to the standard service. Overall, the data demonstrated that the investigated intensive aphasia clinics were able to be incorporated into the subacute setting in each of the three facilities involved in the research with high participant attendance and satisfaction, resulting in a significant reduction in the perceived negative impact of aphasia on everyday life and improved spoken language production. Overall positive feedback from caregivers and clinicians also supported its feasibility. From an organisational perspective, the study demonstrated that two of the three intensive models could be introduced with less staffing costs per hour of treatment per client than the current standard service model.

The advantage of cost analysis is that it allows services to quantify the expenditure associated with intervention before implementing changes to service delivery (Waters et al., 2004). While there has been some subjective reports regarding the potential cost effectiveness of computer (Wertz & Katz, 2004) and group therapy (Elman & Bernstein-Ellis, 1999) for people with aphasia, the current study provides some objective data to support these statements. Although the present study did not take account of all service costs (e.g., initial purchasing of computer software programmes, group resources), the current data suggest that once appropriate equipment and resources are in place, therapy intensity can be enhanced

using such models at reduced staffing costs per hour of treatment per client compared to the standard service.

The comparatively high costs of the SPTA model in the present study, however, was unexpected and warrants further investigation into how best to incorporate SPTAs in the management of aphasia. Two factors largely accounted for the increased costs for the SPTA model, namely, (i) increased non-contact time from the SLP preparing each SPTA session (as it is outside an SPTA's scope of practice to plan therapy tasks), and (ii) the cost of the SPTA providing the treatment itself. Due to additional clinician time preparing the SPTA therapy sessions, the amount of non-contact time required by the SLP was markedly increased compared to the other models, attributing to the increased costs. This is also likely to be the primary reason for the lower clinician satisfaction ratings for certain items in this model compared to the group and computer therapy models.

The finding that the SPTA model required extra indirect time from the SLP is in contrast to literature which suggests that the use of allied health assistants is to allow health professionals more "free time" (Lizarondo, et al., 2010; Nancarrow, Moran, Wiseman, Pighills, & Murphy, 2012). Even so, Nancarrow et al., (2012) assert that an important component of introducing assistant roles is the decision making surrounding task delegation, which can be a complex and multi-faceted process. Further consideration of the type of treatment tasks being delegated to the SPTA in the intensive treatment of aphasia is therefore needed to maximise the cost efficiency of the role.

One potential solution is for the SPTA to provide computer-based therapy. Although some planning and supervision from the SLP would still be required, the use of software programmes is more prescriptive and notably less resource and time intensive than providing traditional paper-based therapy. If SLPs do plan individual traditional paper based tasks to be completed with the SPTA with their aphasia clients then careful selection of clients with aphasia is recommended. For example, a SLP involved in the SPTA model commented that

higher level language tasks involving more ambiguous or abstract scoring (e.g., verbal explanation tasks) required a noticeably increased amount of daily consultation time between the SPTA and SLP. Therefore, selection of clients (i.e., lower level aphasia) who can undertake more categorical and prescriptive/hierarchical tasks (e.g., spoken word to picture matching) is recommended when providing SPTA therapy in the future.

The high participant attendance and satisfaction from participants and caregivers provides evidence towards the clinical feasibility of embedding the clinics within the three investigated subacute facilities. Despite some reports that the increased intensity made participants more tired, average participant attendance across the clinics was very high (i.e., above 90%) with low attrition rates, being comparable to the standard service. This finding is disparate to previous research involving intensive aphasia treatment. A recent Cochrane review indicated that four studies which compared a high intensity aphasia treatment with a low intensity treatment reported difficulties providing planned intensive interventions due to patient attrition and non-compliance (Brady, et al., 2012). One of these studies reported that only 13 of the 51 participants received 80% or more of the planned intensive intervention (Bakheit et al., 2007). While the intensive treatment studies that reported reduced attendance involved predominately traditional one on one individual therapy, the high attendance in the present study may have been related to the different service delivery models which facilitated increased intensity that were employed.

It is possible that the positive aspects of treatment reported by participants (and caregivers and clinicians) in the present study, including the social connectedness that participants perceived and the quality of staff, and increased confidence may have been facilitators and motivators in participants' continued attendance in the intensive therapy. In the group therapy and computer therapy models of the present study, the fact that participants received part of their treatment alongside other participants with aphasia may have led to this perceived social support, which have been found to be a facilitator of successful recovery in

people with aphasia (Grohn, Worrall, Simmons-Mackie, & Brown, 2012). In the intensive clinics, participants had greater exposure to this positive supportive environment fostered by the therapy and staff themselves compared to the standard service.

Both participants and their caregivers also reported very high satisfaction with each of the intensive therapy models, with the vast majority recommending the model to other clients with aphasia. The high caregiver satisfaction in the present research is in contrast to a previous study of caregiver's perceptions of speech-language pathology services for people with aphasia which revealed only 63% of caregivers perceived the support from the services to be adequate (Blom Johansson, Carlsson, Östberg, & Sonnander, 2012). Complaints about the services received in this same study were mostly pertaining to the insufficient amount of services the person with aphasia received (Blom Johansson, et al., 2012). Not surprisingly, the intensity of treatment was one aspect in the current study that different caregivers and participants with aphasia reported as a positive aspect of the treatment.

Limitations and Future Directions

Although the study's focus was on clinical feasibility versus efficacy of treatment, certain research design limitations were evident. Funding for the study was not provided for blinded assessors, therefore, pre and post-treatment assessments were performed by the treating clinician, as per routine clinical practice. Even so, standardisation of assessments and scoring procedures were maintained at all times to minimise bias.

While the present study focussed on the clinical feasibility of embedding intensive clinics, it is unclear whether similar findings from the clinics may have been achieved within a shorter treatment block. In fact, separate analyses of six participants who were unable to complete the entire treatment block (completing on average 7.6 of 11 week block), revealed comparable improvements to the impact of their aphasia on the Disability Questionnaire compared to participants who completed the entire block. It is may therefore be possible that

a shorter treatment block (e.g., 8 weeks) may, therefore, yield comparable outcomes albeit at a reduced total cost of service to the healthcare provider. Further research into the dosage of intervention to achieve optimal client and organisation outcomes is therefore warranted.

The present study also involved the models being embedded and investigated separately across the three sites. Future research into the outcomes of a hybrid model (i.e., a combination of all three models) may be therefore useful. Moreover, it is unclear from the present study whether the effects of treatment are a result of the increased individual therapy hours being provided, increased therapy from the alternate models (i.e., group, SPTA) or a combination of both. Subsequently, further research which includes comparison to another group providing individual therapy alone delivered in an intensive model may be useful to answer this question, albeit more cost-intensive from a service provider perspective. Due to the non-randomised nature of the present pilot study, certain participant demographics were not evenly matched between groups (i.e., time post onset being significantly higher in the group model), which may have potentially influenced results. Future research using a stratified randomisation design may help minimise potential confounds when comparing outcomes between groups. The satisfaction outcome measures were also only utilised in the intensive group, thereby no comparative to the standard service was available. Future investigations may therefore wish to include comparing clinician, client and caregiver satisfaction between standard and more intensive models.

Conclusion

For an alternative model of care to be deemed successful, it should be considered a success from the perspective of both the client and healthcare provider, as well as the clinician (Comans, Clark, Cartmill, Ash, & Sheppard, 2011). The present research revealed that from a client's perspective, participants in the intensive aphasia clinics showed high satisfaction and

reported a significant reduction in the negative impact that the aphasia had on their everyday life and demonstrated improved spoken language production. From a healthcare provider perspective, high attendance, and lower cost of treatment per hour/per client for the group therapy and computer therapy models were found when compared to the standard service model. Lastly, from a clinician perspective, all SLPs providing the intensive treatment reported they would recommend the treatment to people with aphasia, with perspectives from the clinician being further explored in future publications. It is anticipated that the findings and recommendations of the present research will be used to evoke and encourage further translational research into the management of clients with aphasia in the subacute setting to maximise client and organisational outcomes.

Acknowledgements

The authors would like to sincerely thank the participants with aphasia and their caregivers for their involvement in the study and the diligence and care of the SLPs involved in providing treatment at Gold Coast Hospital, QEII Jubilee Hospital and Ipswich Hospital. This study was funded by Queensland Health, Allied Health Profession's Office of Queensland Models of Care grant. Funding of computer equipment was also provided by the Rural Stroke Outreach Service.

References

- American Speech-Language-Hearing Association. (2013). *Speech-language pathology assistant scope of practice* [Scope of Practice]. from www.asha.org/policy.
- Antonucci, S., M (2009). Use of semantic feature analysis in group aphasia treatment *Aphasiology*, 23(7-8), 854-866.
- Aten, J., Caligiuri, M., P, & Holland, A. (1982). The efficacy of functional communication therapy for chronic aphasic patients. *Journal of Speech and Hearing Disorders*, 47, 93-96.
- Bakheit, A. M. O., Shaw, S., Barrett, L., Wood, J., Carrington, S., Griffiths, S., et al. (2007). A prospective, randomized, parallel group, controlled study of the effect of intensity of speech and language therapy on early recovery from poststroke aphasia. *Clinical Rehabilitation*, 21(10), 885-894.
- Bersano, A., Burgio, F., Gattinoni, M., & Candelise, L. (2009). Aphasia burden to hospitalised acute stroke patients: need for an early rehabilitation programme. *International Journal of Stroke*, 4(6), 443-447.
- Berthier, M., L. (2005). Poststroke aphasia: Epidemiology, pathophysiology and treatment. *Drugs Aging*, 22(2), 163-182.
- Bhagal, S. K., Teasell, R., & Speechley, M. (2003). Intensity of aphasia therapy, impact on recovery. *Stroke*, 34(4), 987-992.
- Blom Johansson, M., Carlsson, M., Östberg, P., & Sonnander, K. (2012). Communication changes and SLP services according to significant others of persons with aphasia. *Aphasiology*, 26(8), 1005-1028.
- Bowen, A., Hesketh, A., Patchick, E., Young, A., Davies, L., Vail, A., et al. (2012). Clinical effectiveness, cost effectiveness and service users' perceptions of early, well-resourced communication therapy following a stroke: a randomised controlled trial (the ACT NoW Study). *Health Technology Assessment*, 16(26).
- Brady, M., C, Kelly, H., Godwin, J., & Enderby, P. (2012). Speech and language therapy for aphasia following stroke. *Cochrane Database of Systematic Reviews*, 5.
- Brumfitt, S. M., & Sheeran, P. (1997). An evaluation of short-term group therapy for people with aphasia. *Disability and Rehabilitation*, 19(6), 221-230.
- Comans, T., Clark, M., J, Cartmill, L., Ash, S., & Sheppard, L., A. (2011). How do allied health professionals evaluate new models of care? What are we measuring and why? *Journal of Healthcare Quality*, 33(4), 19-28.
- Dickey, L., Kagan, A., Lindsay, M., P, Fang, J., & Rowland, A. (2010). Incidence and profile of inpatient stroke-induced aphasia in Ontario, Canada. *Archives of Physical Medicine and Rehabilitation*, 91, 196-202.
- Doesborgh, S., J, van de Sandt-Koenderman, M., W, M, E, Dippel, D., W, J, van Harskamp, F., Koudstaal, P., J, & Visch-Brink, E., G. (2004). Cues on request: The efficacy of Multicue, a computer program for wordfinding therapy. *Aphasiology*, 18(3), 213-222.
- Ellis, C., Simpson, A., Bonilha, H., Mauldin, P., & Simpson, K. (2012). The one-year attributable cost of poststroke aphasia. *Stroke*, 43(5), 1429-1431.
- Elman, R. J., & Bernstein-Ellis, E. (1999). The efficacy of group communication treatment in adults with chronic aphasia. *Journal of Speech, Language, and Hearing Research*, 42(2), 411-419.

- Fink, R., B, Brecher, A., Sobel, P., & Schwartz, M. (2005). Computer-assisted treatment of word retrieval deficits in aphasia. *Aphasiology*, 19(10/11), 943-954.
- Fink, R., B, & Schwartz, M., F. (2000). MossRehab Aphasia Center: a collaborative model for long-term rehabilitation. *Topics in Stroke Rehabilitation*, 7(2), 32-43.
- Gialanella, B., & Prometti, P. (2009). Rehabilitation length of stay in patients suffering from aphasia after stroke. *Topics in Stroke Rehabilitation*, 16(6), 437-444.
- Gray, L. (2002). Subacute care and rehabilitation. *Australian Health Review*, 25(5), 140-144.
- Grohn, B., Worrall, L., E, Simmons-Mackie, N., & Brown, K. (2012). The first 3-months post-stroke: What facilitates successfully living with aphasia? *International Journal of Speech-Language Pathology*, 14(4), 390-400.
- Hilari, K., Needle, J., J , & Harrison, K., L. (2012). What are the important factors in health-related quality of life for people with aphasia? A systematic review. *Archives of Physical Medicine and Rehabilitation*, 93(1), S86-S96.
- Howard, D., Swinburn, K., & Porter, G. (2004). *Comprehensive Aphasia Test*. Routledge: Psychology Press.
- Kelly, H., Brady, M., C, & Enderby, P. (2010). Speech and language therapy for aphasia following stroke. *The Cochrane Collaboration*(7), 1-166.
- Levenson, S. (2000). The future of subacute care. *Clinical Geriatric Medicine*, 16(4), 683-700.
- Lizarondo, L., Kumar, S., Hyde, L., & Skidmore, D. (2010). Allied health assistants and what they do: A systematic review of the literature. *Journal of Multidisciplinary Healthcare*, 3, 143-153.
- Marshall, R., C. (1993). Problem-focused group therapy for mildly aphasic clients. *American Journal of Speech-Language Pathology*, 36, 338-350.
- Meike, W., & van de Sandt-koenderman, E. (2011). Aphasia rehabilitation and the role of computer technology: Can we keep up with modern times? *International Journal of Speech-Language Pathology*, 13(1), 21-27.
- Nancarrow, S., Moran, A., Wiseman, L., Pighills, A., & Murphy, K. (2012). Assessing the implementation process and outcomes of newly introduced assistant roles: a qualitative study to examine the utility of the Calderdale Framework as an appraisal tool. *Journal of Multidisciplinary Healthcare*, 5, 307-317.
- Robey, R. R. (1998). A meta-analysis of clinical outcomes in the treatment of aphasia. *Journal of Speech, Language, and Hearing Research*, 41(1), 172-187.
- Ross, A., Winslow, I., & Marchant, P. (2006). Evaluation of communication, life participation and psychological well being in chronic aphasia: The influence of group intervention. *Aphasiology*, 20(5), 427-448.
- Royal College of Speech Language Therapists. (2009). RCSLT Policy Statement: Education and training for assistants/support workers. from <http://www.rcslt.org/members/education%20training%20for%20assistants%20policy%20paper>
- Schroder, C., Schupp, W., Seewald, B., & Haase, I. (2007). Computer-aided therapy in aphasia therapy: evaluation of assignment criteria. *International Journal of Rehabilitation Research*, 30(4), 289-295.
- Simmons-Mackie, N., Elman, R. J., Holland, A., L, & Damico, J., S. (2007). Management of discourse in group therapy for aphasia. *Topics in Language Disorders*, 27(1), 5-23.

- Speech Pathology Australia. (2007). Parameters of practice: Guidelines for delegation, collaboration and teamwork in speech pathology practice.
- Wallesch, C., & Johannsen-Horbach, H. (2004). Computers in aphasia therapy: Effects and side-effects. *Aphasiology*, 18(3), 223-228.
- Walsh, S., Wenke, R., Lawrie, M., Hobson, T., Comben, W., Romano, M., et al. (2012). *Clinician's perspective of delivering intensive aphasia treatment: Barriers and facilitators*. Paper presented at the Speech Pathology Australia National Conference.
- Waters, T., M, Logemann, J., A, Pauloski, B., R, Rademaker, A., W, Lazarus, C., L, Newman, L., et al. (2004). Beyond efficacy and effectiveness: Conducting economic analyses during clinical trials. *Dysphagia*, 19, 109-119.
- Wertz, R., T, & Katz, R., C. (2004). Outcomes of computer-provided treatment for aphasia. *Aphasiology*, 18(3), 229-244.

Table 1. Demographics of participants with aphasia

<i>Variable</i>	<i>Standard service</i>	<i>Intensive treatment</i>		
		Computer therapy	Group therapy	SPTA therapy
No. of participants' data collected*	n=22	n= 13	n=11	n=7
No. of <i>unique</i> participants in each group*	n=22*	n=10	n=8	n=7
Mean age in years (SD)	66.7 (13.1)	63.5 (12.6)	61.6 (15.5)	63.1 (9.9)
Mean time post onset in months (SD)	6.1 (9.9)	9.1 (8.29)	27.5 (28.37)	9.1 (14.2)
% females	36%	20%	12%	29%
% males	64%	80%	88%	71%
Mean years of education (SD)	12 (2.9)	10.4 (2.83)	11.25 (2.9)	15.3 (0.9)
% inpatients [^]	59%	15%	0%	15%
% outpatients	41%	85%	100%	85%

*Certain participants in the standard block went on to participate in the intensive block. [^] as some clients shifted from inpatient to outpatient during the treatment block, this is based on status for the majority of the therapy block.

Table 2 Summary of organisational outcome measures

Organisational outcome	Unit of measurement used for analysis
Duration of each treatment session	minutes
Total number of treatment sessions per week	sessions/week
Client attendance (total % of sessions attended during admission)	% sessions attended
Direct 1:1 speech-language pathologist contact time with participant	% direct therapist time
Non-contact therapist time (e.g., organising therapy materials, preparing session, writing in progress notes etc.) for speech-language pathologist and SPTA	minutes/ week
Type of session (i.e., group, individual, therapy, assessment)	categorical
Length of treatment service	weeks
Type of patient	inpatient/ outpatient

Table 4 Mean cost of treatment per client and pro-rata cost of therapy per hour per client

<i>Measure</i>	<i>Intensive service models</i>			
	Standard service	Computer therapy	Group therapy	SPTA therapy
Total cost of treatment service*	\$1399 (for 25 hrs total therapy)	\$3570 (for 88 hrs total therapy)	\$3289 (for 84 hrs therapy)	\$6655 (for 91 hrs total therapy)

Pro-rata cost of treatment per hour per client (\$/hr therapy) **\$56** **\$41** **\$39** **\$73**
(including indirect time)

N.P Figures are based on current Wage rates + 30% on costs: [HP3.4(average HP level)= \$36.94 per hour x 30% = \$48.02, OO3.1 = \$26.68 per hour x 30% = 34.69]

Table 4 Mean within group differences between pre and post treatment for Spoken Language and Disability Questionnaire

Group	Pre Mean (SD)	Post Mean (SD)	Mean pre-post difference (SD)	t- or z-score	p
<i>Spoken Language Sub-test</i>					
Standard service (n=20)	43.55 (20.12)	53.25 (22.95)	9.70 (12.29)	t = -3.553	0.002*
Computer therapy (n=13)	31.84 (19.96)	45.61 (24.91)	13.77 (16.49)	t = -3.010	0.011*
Group therapy (n=11)	41.72 (26.82)	52.72 (29.47)	11.00 (11.64)	z = -2.363	0.018*
SPTA therapy (n=6)	31.00 (19.04)	49.00 (20.89)	18.00 (12.58)	t = -3.503	0.017*
<i>Disability Questionnaire</i>					
Standard service (n=17)	55.82 (25.01)	50.76 (19.56)	5.06 (22.30)	t = 0.935	0.364
Computer therapy (n=13)	49.00 (16.99)	36.23 (20.24)	12.76 (14.63)	t = 2.545	0.026*
Group therapy (n=11)	56.45 (22.66)	34.63 (17.82)	21.81 (18.97)	t = 3.813	0.003*
SPTA therapy (n=6)	69.33 (10.31)	51.50 (11.24)	17.83 (8.37)	t = 5.215	0.003*

SD, standard deviation; SPTA, speech pathology therapy assistant.
 *significant (p ≤ .05).

Table 5 Mean organisational outcomes used to calculate cost of service

<i>Measure</i>	Standard service	<i>Intensive treatment</i>		
		Computer therapy (n= 13)	Group therapy (n=11)	SPTA therapy (n=6)
Hours aphasia therapy/week	3 hrs/week	8.7 hrs/week	8.8 hrs/week	9.4 hrs/week
No. sessions week	3.67 sessions/ week	4.04 sessions/ week	2.38 sessions/ week	2.78 sessions/ week
Duration of treatment	8.3 weeks	10.2 weeks	9.56 weeks	9.67 weeks
% treatment provided directly by SP (i.e., 1:1 supervised therapy)	87%	73%	69%	63%
% indirect SP treatment (e.g., unsupervised)	13%	27%	31%	37%

computer therapy, indirect group therapy, SPTA therapy)				
Amount of non-contact SP time (i.e., admin)	0.9hrs /week	0.94hrs/week	1.0hr/week	3.68hrs/week
Amount of client attributable SPTA non contact time (e.g., client notes, preparing session)	n/a	n/a	n/a	1.87hrs/week
Amount of non-client attributable non-contact SPTA/AHA time (e.g., updating resources)	n/a	0.05 hrs/week	0.13 hrs/week	1.2 hrs/week
