

## Abstract

Preliminary data is presented from a study in progress investigating whether speech-language pathology (SLP) intervention for a specific cognitive deficit (attention) will facilitate improvement of functional communication skills (conversational discourse) for individuals with closed head injury (CHI) at an acute rehabilitation phase. A randomized design was used to create treatment and control groups. Results from one individual are analyzed utilizing two procedures to determine which may be more useful in characterizing conversational ability of individuals in this population. The results will assist in research procedures for the remaining data. This study may lead to treatment recommendations for individuals with CHI.

## Introduction

Individuals who sustain a closed head injury (CHI) can experience chronic changes in quality of life resulting from cognitive-communication deficits because effective communication skills, such as conversation, require the integrity of a number of cognitive abilities that are frequently disrupted following closed head injury (CHI). Such changes in communication can negatively influence educational, vocational, familial, and social pursuits (Struchen, 2005).

Previous research demonstrates that performances on measures of conversation delineate between non-brain injured (NBI) individuals and individuals with CHI. A response appropriateness procedure (Blank & Franklin, 1980) has been investigated (Coelho, Youse, and Le, 2002; Coelho, Youse, Le, & Feinn, 2003) and it has been suggested that individuals with CHI are less proficient at conversational contributions. However, follow up of these measures (Youse, Coelho, Mozeiko, & Feinn, 2005) revealed overlap in performance, clouding the ability to determine which measures were most sensitive.

Reduced attention and concentration are among the most common cognitive sequela following CHI (Sohlberg & Mateer, 2001; Struchen, 2005) and are important cognitive processes to successful conversation. Although studies have suggested that training of specific skills does not generalize to functional tasks (Cicerone, 2002; Park, Proulx, & Towers, 1999; Sohlberg, McLaughlin, Pavese, Heidrich, & Posner, 2000), little information exists to document this. One study (Youse & Coelho, in press) investigated whether improvements in attention would facilitate conversation discourse in three individuals who were post-onset of CHI. Results indicated minimal change from baselines, only partially supporting the research hypotheses. Such research suggests that cognitive treatments are active; however, there is a limited amount of empirical data that provides evidence for determining the course of intervention for individuals with discourse deficits resulting from TBI (Coelho, 2007).

The present study investigates the use of a cognitive treatment, specifically direct attention training, in an acute rehabilitation population with CHI. The purpose is to determine if improved attention may lead to improved functional communication (conversation). This type of treatment and these analysis procedures have not previously been measured in an acute rehabilitation population.

## Method

This is an A-B-A treatment study. Participation is initialized as soon as consent can be obtained following admission to the rehabilitation hospital and lasts for the length of each individual's hospital stay. The present study investigates one individual from a larger pool of participants in order to evaluate methodological procedures.

### *Participant*

A.J. is a 27 year-old male, who was 7 weeks post-onset of a CHI. He was involved in a rollover ATV accident in which he was not wearing a helmet and experienced loss of consciousness. A.J. was diagnosed by radiologic procedures as having a diffuse axonal injury and right frontotemporal contusions with midline shift. A.J. had no history of neurological deficits, had a high school education and worked as a handyman. He lived at home with his mother. A.J. participated in the study for three weeks.

### *Assessment Measures*

Figure 1 demonstrates the A-B-A research design that was utilized. Two standardized assessments and conversational samples were used for pre- and post testing:

*Cognitive Linguistic Quick Test (CLQT)* (Helm-Estabrooks, 2001). This test identifies strengths and weaknesses in the cognitive-linguistic domains of attention, memory, executive functions, language, and visuospatial skills.

*Attention Process Training Test (APT- Test)* (Sohlberg, Johnson, Paule, Raskin, & Mateer, 1994). This test was specifically designed for use with the APT program and provides a screening measure of attention skills based on the theoretical framework of the APT program.

*Conversational Samples:* In addition to standardized treatment, three conversational samples were taken at baseline and post-treatment. Please see “analysis of conversations” below for a complete description of the procedures.

### *Treatment Conditions*

Following assessment measures, attention training was initialized. The participant received training utilizing the *Attention Process Training Program (APT)* (Sohlberg et al., 1994) which was administered based on area(s) of deficit as determined by assessment. The APT tasks involve the use, manipulation, and repetition of auditory and visual stimuli focusing on each of the components of attention: sustained, selective, alternating, and divided. Exercises were repeated until the criterion of 80% accuracy was achieved.

In addition, a conversational sample was taken once a week as a treatment probe. Please see “analysis of conversations” below for a complete description of the procedures.

### *Analysis of Conversations*

Based on procedures described by Coelho, Youse, and Le (2002), a six-minute sample of each conversation was analyzed. Each conversation was audiotaped and later transcribed verbatim with each utterance being assigned to one of the speakers. Conversations were analyzed using two analysis schemes. Response appropriateness (Coelho et al., 2002) is described in Table 1. Modified response appropriateness is described in Table 2.

### *Results*

The results of the standardized testing are shown in Figures 2 and 3. The subtest of sustained attention on the APT-Test improved from 7 of 30 correct to 30 of 30 correct. No other improvement was noted on standardized assessment measures.

Conversations were initially analyzed for response appropriateness according to the procedures outlined by Coelho and colleagues (2002) (Table 1, Table 3, and Figure 4). According to this procedure, adequate responses appear to account for the majority of the participant’s responses. A reanalysis of performance was completed with a modified version of the response appropriate measures (Table 2) which included counting “no response” as a turn and coded delayed responses as such. According to these procedures, minimum responses appear to account for the majority of the participant’s responses, along with behaviors that may more adequately describe the communication behaviors of this individual (Table 4 and Figure 5).

### *Discussion*

With the exception of sustained attention, little to no improvement was made on any of the standardized assessment measures.

With regard to attention training, sustained attention was targeted in therapy per the results of the APT-Test. This may be the reason for the substantial improvement in sustained attention on the testing procedures.

With regard to conversational measures, using the original analysis procedure (Table 1, Table 3, and Figure 4) suggests that this analysis system may not be representative of communication ability of individuals with CHI at the acute rehabilitation phase. According to these procedures, a “yes” or “no” response would be considered “adequate”; therefore, “adequate responses” accounted for the majority of turns in this individual’s conversations. This system does not account for significant, non-pragmatic, pauses in responses or lack of responses that render the conversation awkward.

Using a modified analysis system (Table 2) may be more appropriate for an acute rehabilitation population. Modifications may account for single word responses (e.g., “yes”, “no”) that are “technically” adequate yet do not contribute to the conversation and for pauses or unintelligible responses that change the tenor of the conversation.

It is also important to note that current hospital stays are brief; therefore, three training sessions per week may not be enough. It is possible that providing attention training on a daily basis may yield a more significant impact on conversational abilities.

This research continues previous efforts to investigate conversational abilities in individuals with CHI in order to determine whether additional targeted intervention for specific cognitive abilities will improve conversational discourse in order to facilitate more functional outcome. These two analysis schemes, completed as a preliminary investigation into methodological procedures for a study in progress, provide valuable insight into measures that may more adequately define the conversation ability of participants. Overall, this information may assist speech-language pathologists in determining communication skills to target during intervention.

## References

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Figure 1. A-B-A Study Design

Pre-Testing	Treatment	Post-Testing
<b>SLP Tests</b> -CLQT -APT-Test  <b>Conversation Samples</b> Three 10-minute conversations with the examiner	<b>Attention Process Training Program</b> 3 times/week for 30 minutes each session for length of inpatient stay  <b>Conversation Samples</b> One 10-minute conversation with the examiner on the third visit each week	<b>SLP Tests</b> -CLQT -APT-Test  <b>Conversation Samples</b> Three 10-minute conversations with the examiner

Note: CLQT = Cognitive Linguistic Quick Test; APT-Test = Attention Process Training Test

Figure 2. A.J.'s results on the CLQT (Helm-Estabrooks, 2001).

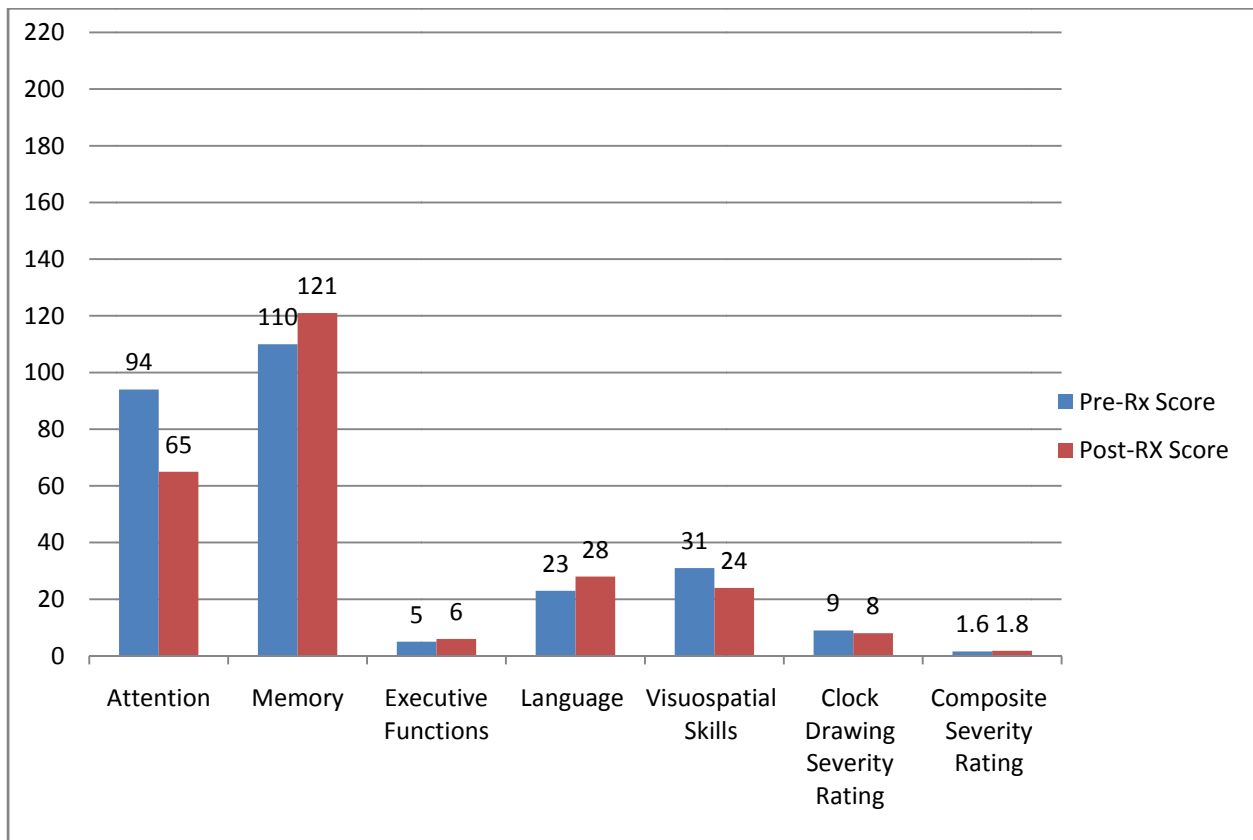


Figure 3. A.J.'s results on the APT-Test (Sohlberg et al., 1994)

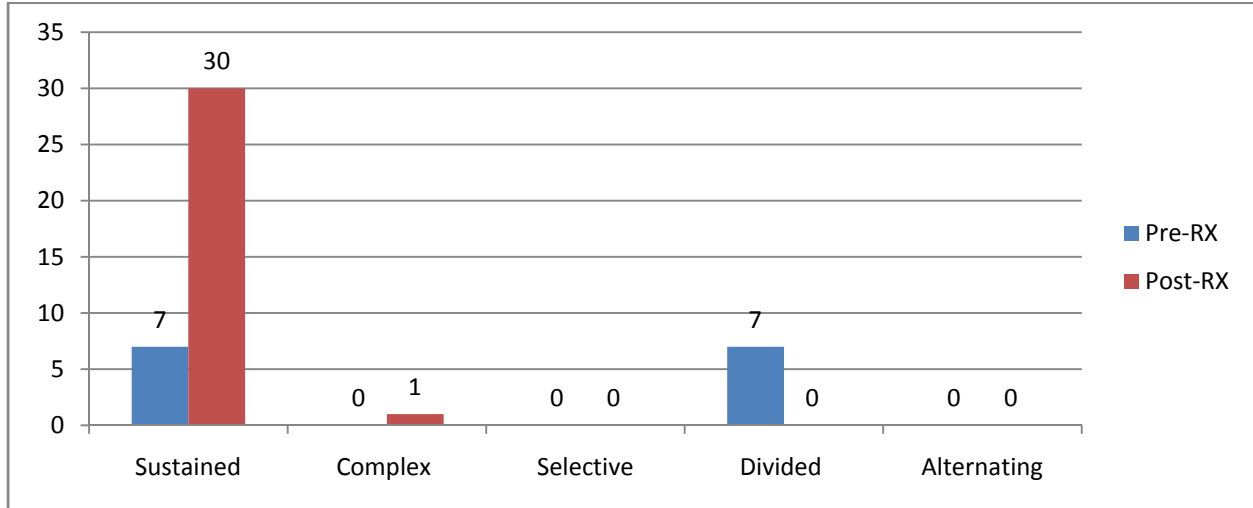


Table 1. Response appropriateness measures used to analyze conversations (Blank & Franklin, 1980; Coelho, Liles, & Duffy, 1991; Coelho, Youse, & Le, 2002).

Category	Measure	Definition	Example
Appropriateness: Speaker Initiations	Obliges	Utterances containing explicit requirements for a response.	“Where do you live?”
	Comments	Utterances not containing an explicit demand for a response.	“It’s a nice place to work.”
Appropriateness: Speaker Responses	Adequate	Utterances that appropriately met the initiator’s verbalization.	In response to the question, “What time is it?” the response might be “It’s three o’clock.”
	Adequate Plus	Utterances that are relevant and elaborate on the theme, providing more information than was requested.	In response to the question “What time is it?” the response might be, “It’s three o’clock. I know that because I just passed the new clock at the Dime Savings Bank.”
	Inadequate	Utterances in which the information offered is invalid, irrelevant, or insufficient to meet the constraints established by the initiator’s utterance.	In response to the question, “What time is it?” the response might be, “I’m 37 years old.”

Table 2. Modified response appropriateness measures.

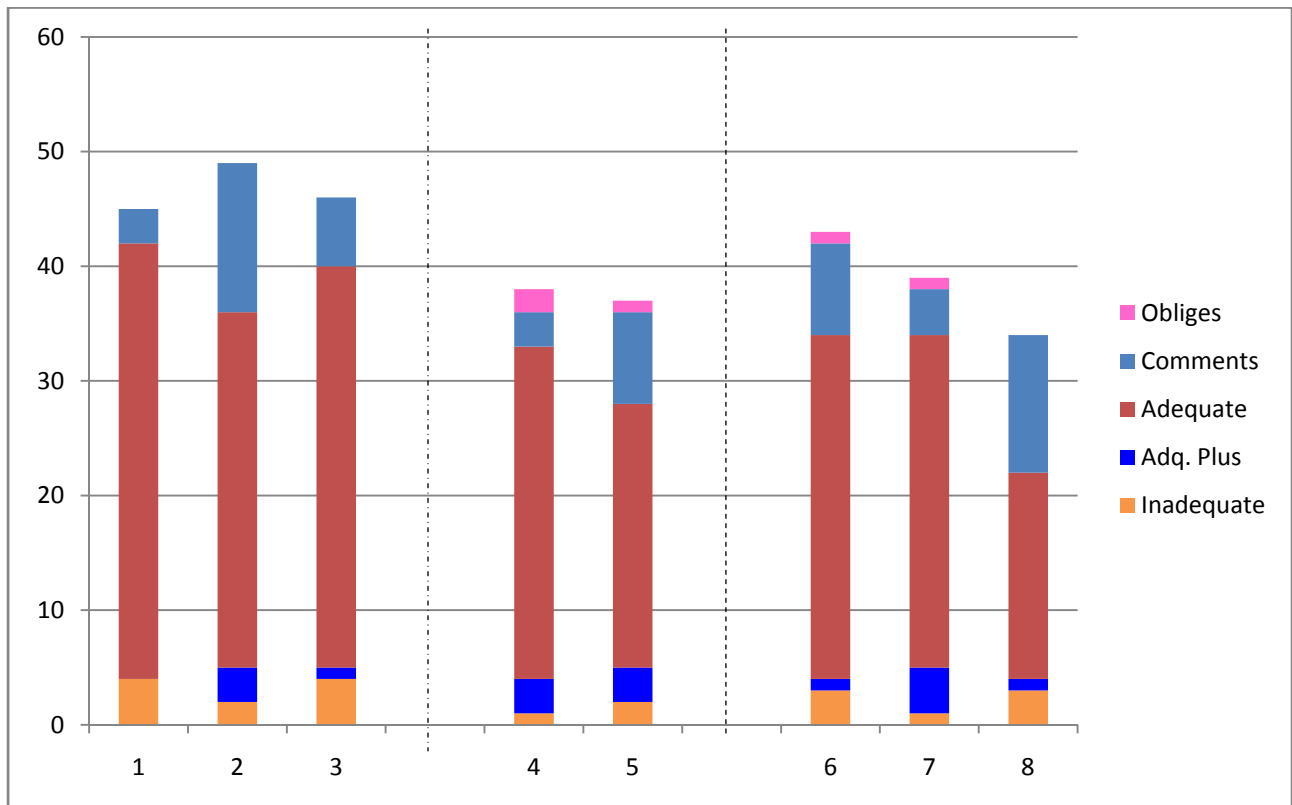
Category	Measure	Definition	Example
<b>Speaker Initiations</b>	Obliges	Utterances containing explicit requirements for a response.	<i>“What’s your dog’s name?”</i>
	Comments	Utterances not containing an explicit demand for a response.	<i>“The people are nice here.”</i>
	Understanding	Utterances, including non-linguistic, that demonstrate that the communication partner is following along or understands what has been said. (e.g., okay, uh huh, mmhmm, right)	<i>“I went to the football game.” “Mmhm.” “And my brother came, too.”</i>
	Clarification	Utterance that demonstrates a need for repetition or clarification of information.	<i>“What is your dog’s name.” “Huh?” “What is your dog’s name?”</i>
<b>Speaker Responses</b>	Adequate Minimum Response	Utterances that answer the initiator’s verbalization but are limited to a single word. This category is used only when a single word response is not considered completely adequate.	<i>“Where do you like to go camping?” “Wherever.”</i>
	Adequate	Utterances that appropriately met the initiator’s verbalization. If appropriate, this can be limited to a single word response.	<i>“What kinds of sports do you like?” “I like football.”</i>
	Adequate Plus	Utterances that are relevant and elaborate on the theme, providing more information than was requested.	<i>“Who was the little girl who visited you yesterday?” “That’s my brother’s daughter. Her name is Liz. She’s about 5 or 6.”</i>
	Inadequate	Utterances that do not meet the initiator’s verbalization (e.g., tangential).	<i>“What’s your favorite movie?” “Mmm... yeah”</i>
	No response	When no response is provided following the initiator’s verbalization.	<i>“Do you like any other sports?” (Yawn)</i>
	Partially Unintelligible	Utterances in which some information is unintelligible; however, enough information is available that the utterance can clearly be categorized.	<i>What are some of your hobbies? “I like to [mumble] and hunt.”</i>
	Completely Unintelligible	Utterances that are not intelligible; and, therefore, cannot be categorized.	<i>“Have I told you I’m from the Philadelphia area?” [Mumble.]</i>
	Delayed	Utterances that answer the initiator’s verbalization but are delayed (e.g., ≥4 seconds) rendering the response awkward.	<i>“What do you like to watch on TV?” (8 second delay) “I like watching wrestling.”</i>
	Other	Utterances that do not meet the criteria for one of the categories above.	



Table 3. A.J.'s performance on response appropriateness measures based on Table 1.

	Obliges	Comments	Adequate	Adq. Plus	Inadequate
<b>1</b>	0	4	46	1	5
<b>2</b>	3	15	34	3	2
<b>3</b>	0	8	40	1	5
<b>4</b>	2	5	33	3	1
<b>5</b>	1	10	29	6	2
<b>6</b>	1	8	35	1	3
<b>7</b>	3	5	36	5	2
<b>8</b>	0	14	23	1	4

Figure 4. A.J.'s performance on response appropriateness measures based on Table 1.



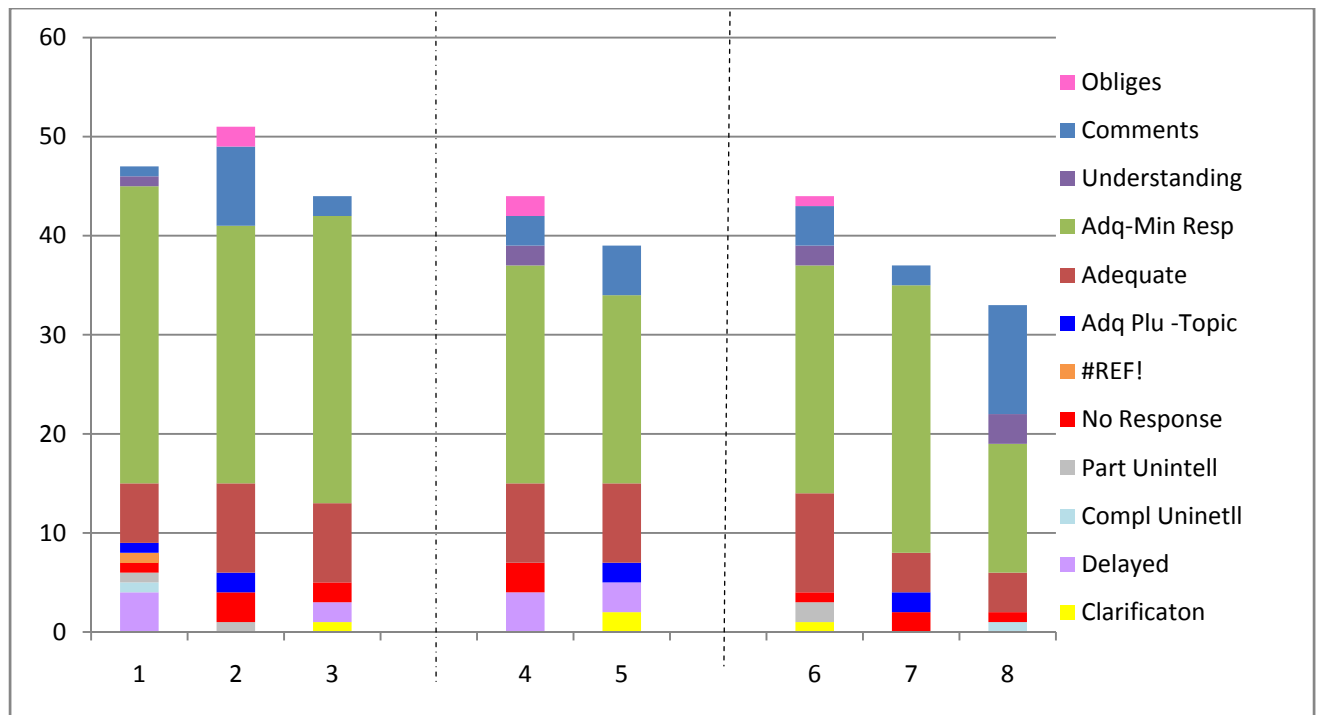
Note: Conversations 1, 2, 3 are baseline; 4 and 5 are treatment probes; 6, 7, 8 are post-treatment.

Table 4. A.J.'s performance on response appropriateness measures based on Table 3

	Obl	Com	Und	Adq-Min	Adq	Adq Plu	No Res	Part Un	Comp Un	Delay	Clarif
<b>1</b>	0	1	1	30	6	1	1	1	1	4	0
<b>2</b>	2	8	0	26	9	2	3	1	0	0	0
<b>3</b>	0	2	0	29	8	0	2	0	0	2	1
<b>4</b>	2	3	2	22	8	0	3	0	0	4	0
<b>5</b>	0	5	0	19	8	2	0	0	0	3	2
<b>6</b>	1	4	2	23	10	0	1	2	0	0	1
<b>7</b>	0	2	0	27	4	2	2	0	0	0	0
<b>8</b>	0	11	3	13	4	0	1	0	1	0	0

Note: Obl =Obliges; Com = Comments; Undstd = Understanding; Adq-Min = Adequate Minimum Response; Adq = Adequate; Adq Plu = Adequate Plus; No Res = No response; Part Un = Partially Unintelligible; Comp Un = Completely Unintelligible; Delay = Delayed; Clarif=Clarification

Figure 5. A.J.'s performance on response appropriateness measures based on Table 3.



Note: Conversations 1, 2, 3 are baseline; 4 and 5 are treatment probes; 6, 7, 8 are post-treatment.