

**A CLINICAL TUTORIAL ON NEUROGENIC STUTTERING FOR SPEECH-
LANGUAGE PATHOLOGISTS**

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19SLP028

**A Dissertation Submitted in Part Fulfilment of Final Year
Master of Science (Speech-Language Pathology)**

University of Mysuru

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September, 2021

CERTIFICATE

This is to certify that this dissertation entitled “**A Clinical Tutorial on Neurogenic Stuttering for Speech-Language Pathologists**” is the bonafide work submitted in part of fulfilment for the Degree of Master of Science (Speech-Language Pathology) of the student with Registration No: **19SLP028**. This has been carried out under the guidance of a faculty of this institute and has not been submitted earlier to any other university for the award of any other Diploma or Degree.

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CERTIFICATE

This is to certify that this dissertation entitled “**A Clinical Tutorial on Neurogenic Stuttering for Speech-Language Pathologists**” has been prepared under my supervision and guidance. It is also certified that this has not been submitted earlier to any other University for the award of any other Diploma or Degree.

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DECLARATION

This is to certify that this Master's dissertation entitled "**A Clinical Tutorial on Neurogenic Stuttering for Speech-Language Pathologists**" is the result of my own study under the guidance of Dr. Sangeetha Mahesh, Associate Professor and Head in Department of Clinical Services, All India Institute of Speech and Hearing, Mysuru and has not been submitted earlier in other University for the award of any Diploma or Degree.

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*Dedicated to My
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CHAPTER I

INTRODUCTION

The systematically collected information from various resources about the rare conditions can be shared using tutorial. The word “tutorial” as defined by various scientific and English dictionaries, refers to an “instruction” book or “intensive instruction” in some area. The term “tutorial” can be defined as a paper, book, video or computer program which provides sufficient information with respect to specific subject or topic. It might be helpful in cases where there are limited resources and exposure for professionals especially in the field of rehabilitation. Tutorial can also act as a quick and easy reference tool. Tutorial can also be used as a tool to measure one’s understanding on a specific topic and also provide immediate feedback through a variety of questions or activities ranging from easy to difficult.

Fluency is a term that refers to the effortless and smooth flow of speech. Disruption or failure in this smooth flow of speech, leads to various fluency disorders. Stuttering is one such fluency disorder. Stuttering can be classified into developmental stuttering and acquired stuttering. The common type of stuttering is developmental stuttering which is mostly found during childhood. Acquired stuttering is usually seen beyond the typical childhood. Acquired stuttering is a rare condition; it is further divided into psychogenic stuttering and neurogenic stuttering based on their aetiology. When acquired stuttering arises due to nervous system damage it is known as neurogenic stuttering. In case of psychogenic stuttering, it will be characterised by a behavioural dysfunction due to underlying trauma/ emotional or physical stress where as in case of neurogenic stuttering, it will be due to identifiable neurological injury (Miranda Cruz et al. 2018).

The term “neurogenic stuttering” was coined by Canter in 1971. Canter in the same year classified the neurogenic stuttering into three subgroups (dysarthric stuttering, apraxic stuttering and dysnommic stuttering). Limited studies are available on the incidence and prevalence of neurogenic stuttering. Few studies have reported the incidence and prevalence by only considering one of the condition such as stroke and TBI. Theys et al. (2011), reported that in a study conducted on stroke patients, 17 out of 319 participants had neurogenic stuttering leading to an incidence of 5.3% and for more than 6 months stuttering persisted in 2.5% of stroke patients.

There are limited research available on acquired stuttering when compared to developmental stuttering (Ringo & Dietrich, 1995). Therefore, it might be difficult for Speech Language Pathologists to provide a summarised data of specific characteristics as well as for differentially diagnosing between various types of acquired stuttering (Ringo & Dietrich, 1995). Researches in the topic of Neurogenic Stuttering are more of single case studies, therefore it makes it difficult to obtain conclusive data on typical characteristics and for evidence-based intervention practices.

Griffith (2015) conducted a survey to identify the Speech Language Pathologists current perceptions and practice patterns and she reported that out of 39 Speech Language Pathologists who were surveyed 38 of them had previously treated persons with Neurogenic stuttering. When they were asked to rate themselves based on their knowledge on Neurogenic stuttering, most of them rated as “3=some knowledge” or “4=knowledgeable”; in case of experience most of them rated as “3=somewhat experienced” or “4=experienced”. She also reported that since there are many co-occurring conditions with respect to neurogenic stuttering or acquired stuttering it is often advisable to go for multidisciplinary team in the assessment and management. Therefore Speech-

language Pathology students must be educated on the referrals sources and necessary team approach.

Having a thorough understanding of neurogenic stuttering is very much important for SLPs due to three main reasons as reported by Conture et al. (2019). The first reason is that even though the prevalence of neurogenic stuttering is low, it is not uncommon for the Speech-Language Pathologists (SLPs) working in the medical setup to have neurogenic stuttering in their case load. Second reason is that persons with neurogenic stuttering have communication problem in their day to day life and also in their immediate environment just like the persons with developmental stuttering. Therefore persons with neurogenic stuttering also have the right to undergo best evidence based practice for improving their fluency just like the person with neurogenic stuttering. Third reason is that there is also a need to understand whether the developmental stuttering and acquired stuttering are same or different in order to differentially diagnose them. Therefore, there is need to understand the underlying neuropathology, emotional problem and onset of stuttering like dysfluencies in both neurogenic stuttering as well as developmental stuttering.

Pellowski (2010) conducted a study among speech-language pathology students on the knowledge of various aspects of speaking rate and its relation to assessment and management of stuttering. The results found lack of proficiency and lack of confidence in graduate level training. They suggested that rigorous clinical experience would be required in the graduate level program. This shows the need for clinical tutorial which could improve the clinical aspects despite gaining knowledge in theory classes.

Need for the study

Neurogenic stuttering is a condition which can occur due to neurological damage. The characteristics of the neurogenic stuttering can be correlated with various lesion sites. Due to limited research on neurogenic stuttering, identification based on characteristics is difficult. Neurogenic stuttering does not occur in isolation; it generally co-occurs with other conditions such as aphasia, dysarthria and apraxia, therefore it becomes a challenging condition in case of diagnosis and treatment of the disorder.

Considering the prevalence of stuttering, the knowledge about neurogenic stuttering compared to developmental stuttering is less among the budding professionals. Theys et al. (2011) reported that in a study conducted on stroke patients 17 out of 319 participants had neurogenic stuttering, leading to an incidence of 5.3% and for more than 6 months stuttering persisted in 2.5% of stroke patients. In the Indian scenario, the identification of neurogenic stuttering is happening late and the prevalence is less. ARF project titled AIISH survey of fluency disorders (2014-15) analysed 5 years data (2010-14) and stated that among the clients with fluency disorders, 96.8% were identified as having developmental stuttering, 0.4% as neurogenic stuttering, 0.2% as stuttering-cluttering and 0.5% as cluttering.

Researchers suggest that despite gaining knowledge on neurogenic stuttering in theory during speech language pathology course, there can be issues while assessing, diagnosing and treating neurogenic stuttering due to lack of exposure among the students (Pellowski, 2010). In the subject of fluency and its disorders the number of hours students exposed to post graduate (MSLP) course for stuttering is about more than 56 hours and on neurogenic stuttering it is only 4-5 hours, among graduate students (BASLP) 24 hours is

allotted for stuttering and only 3-4 hours for neurogenic stuttering therefore a clinical tutorial can help the students to understand the clinical aspects in better way.

It is important for the students (graduate and post graduates) in the field of speech-language pathology to know about different types of communication disorders and to differentially diagnose them. A clinician can become a good diagnostician only if he/she has direct experience in handling cases and to avail training to diagnose various fluency disorders. Since neurogenic stuttering co-occurs with other conditions, it is often important to differentially diagnose them. Limited exposure to rare conditions is one of the difficulty faced by students.

This tutorial will be developed by keeping this aim in mind. This tutorial will include recent and most suitable definitions of neurogenic stuttering, characteristics of neurogenic stuttering, causes, associated conditions, neuropathological correlates, assessment, differential diagnosis and treatment. All these sections will be explained by using audio-video speech samples along with case discussion focussing on assessment and management strategies for neurogenic stuttering.

This tutorial will help speech-language pathology students to get a clearer understanding of neurogenic stuttering with regard to the assessment and management of neurogenic stuttering.

Aim

The primary aim of the present study is to develop a clinical tutorial for speech-language pathologists on an overview of neurogenic stuttering.

Objectives

1. To develop a clinical tutorial on Neurogenic Stuttering for Speech-Language Pathologists.
2. To validate the content of the tutorial using Questionnaire for Aphasia Treatment Manuals (Goswami, Shanbal, Navitha & Samasthitha, 2010)
3. To compare the knowledge on Neurogenic Stuttering between prospective Speech-Language Pathologists and experienced Speech-Language Pathologists.

CHAPTER II

REVIEW OF LITERATURE

This review of literature will include research regarding neurogenic stuttering. The studies that focus more on various definitions, speech characteristics, neural aetiology, assessment and treatment approaches will be reviewed.

Brief history on neurogenic stuttering

Even though the research in the field of neurogenic stuttering is limited, the stuttering which has its onset in the adulthood is not new in the field of fluency disorders. For the first time neurogenic stuttering was mentioned in the 18th century by the phrenologist Gall and Spurzheine. In the 19th century there were published clinical reports which showed the individuals had stutter-like symptoms.

Kussmaul (1877) has reported in his work a brief description about a young man who had a sudden onset of neurogenic stuttering following a mild stroke what he mentioned as “Aphatisches Stottern” in his work.

Pick (1899) also described about a 63 years old man with acquired stuttering in their word. Even though having all these early evidence, there are very less publications available until the early 1970s and most of the publications consisted of single case studies.

In the year 1971 it was Canter who was the first one to give more detailed information regarding neurogenic stuttering through his influential paper. He presented the diagnostic criteria for acquired stuttering and the ways to classify the three different types of acquired stuttering. After this publication neurogenic stuttering got wider recognition from researchers leading to increase in the number of research in this disorder but most of them, were single case studies (Conture et al. 2019).

There are no shortage of terms used to refer to neurogenic stuttering. Late onset stuttering/stammering, acquired stuttering, adult-onset stuttering, neurological stuttering, cortical stuttering, sudden onset of stuttering, neurogenic stuttering, organic stuttering, stuttering associated with acquired neurological disorders (SAAND), dysphatic stuttering are all terms used by authors to describe neurogenic stuttering (Conture et al. 2019).

Various attempts to define neurogenic stuttering

A neurogenic stuttering of any type by definition occurs due to damage to the nervous system. Therefore to define as neurogenic stuttering there must be a clear evidence that the person's condition or dysfluencies are acquired due to any clear cut neurological lesion (Duffy, 1995; Helm-Estabrooks, 1999).

Culatta & Goldberg, 1995 defined this condition as *“the result of an identifiable neuropathology in a speaker with no history of fluency problem prior to occurrence of the pathology”*.

Helm Estabrooks (1993) gave the distinction between developmental and neurogenic stuttering through his definition *“Stuttering refers to disorders in the rhythm of speech in which the individual knows precisely what he or she wishes to say but at the same time is unable to say it because of an involuntary repetition, prolongation, or cessation of a sound. When the behaviour first occurs, notably worsens, or recurs in the presence of acquired neurological problems, it is diagnosed as stuttering associated with acquired neurological disorders (SAAND)”*.

Jokel et al. (2007) recently stated that *“neurogenic stuttering is generally diagnosed when the onset of stutter-like disfluencies occurs following a neurological event, such as head trauma or disease, which disrupts normal brain function”*.

Conture et al. in order to account for all cases of neurogenic stuttering stated the below definition “*Stuttering associated with the acquired neurological disorders (SAAND) is an acquired or reacquired disorder of fluency characterised by notable, involuntary repetitions or prolongations of speech that are not the result of language formulation or psychiatric problems*”.

Literature also support the view that there can be disappearance of stuttering with neurological changes.

Literature identifying the aetiologies of neurogenic stuttering

A survey done by Market et al (1990) included 100 in the study cases and reported that out of 75.3% of cases analysed, 38.3% had onset of stuttering following head trauma and 37% following ischemic accidents (Conture et al. 2019).

According to the literature, neurogenic stuttering can be caused by any type of central nervous system insult or injury, including cerebrovascular accidents, head trauma, ischemic attacks, tumours, cysts, and other neoplasms, degenerative diseases like Parkinson's disease and multiple sclerosis, and other diseases like meningitis and Guillain-Barre syndrome.

Neurogenic stuttering may be caused due to various aetiologies, CVA (cerebrovascular accidents) is one of the major aetiology. Other aetiologies: acute conditions such as (TBI, stroke, drugs, neurosurgery), degenerative conditions such as (Parkinsons disease, dementia, brain tumors) and other rare causes may often include dialysis, seizures, bilateral thalamotomy or thalamic stimulation (Duffy, 2005)

Neuropathological studies reveals that neurogenic stuttering can occur due to damage in all lobes of the cerebral hemisphere, corpus callosum, brainstem, cerebellum, thalamus and cortico-basal ganglia of the cortical loop (Penttilä et al. 2019).

Neurogenic stuttering often co-occurs with aphasia and dysarthria (Penttilä & Korpijaakko-Huuhka, 2015). Another study (Konig, 2009) reported that among 60 persons diagnosed with neurogenic stuttering 75% of person with neurogenic stuttering had accompanying speech disorders and 50% of person with neurogenic stuttering had aphasia.

Studies were done to study the underlying pathophysiology in case of neurogenic stuttering. The findings of Ludlow & Loucks (2003) suggest that damage to the basal ganglia, corpus callosum, and thalamus is the most likely cause of neurogenic stuttering, which are also important indications of neurodegenerative disorders such as Parkinson's disease. Another study done by Theys et al. (2007) concluded that neurogenic stuttering could be caused by lesions in various brain locations. Neurogenic stuttering has been found linked to lesions in the frontal, parietal, temporal, and occipital lobes, as well as the basal ganglia, pons, and corpus callosum. Theys et al. (2007) studied the same by comparing 20 patients with neurogenic stuttering and 17 post stroke patients without neurogenic stuttering.

Literature Identifying Clinical Characteristics of Neurogenic Stuttering

Neurogenic stuttering is characterised by stuttering on the functional words as well as lexical words, lack of anxiety, absence of secondary symptoms and lack of adaptation effect, stuttering on the grammatical words, dysfluencies (repetitions, prolongations, blocks) can be seen in all position of words (Lundgren et al. 2010).

Various literature recognises 6 differential speech characteristics of neurogenic stuttering which are (1) annoyance, but no anxiety is present while speaking; (2) disfluencies present on both function and content words; (3) secondary symptoms (i.e., facial grimacing, eye blinking, or fist clenching) do not occur during the events of stuttering, (4) disfluencies consisting of repetitions, prolongations, and blocks can occur

at any position of the word or utterance; (5) there is no adaptation effect (the speaker will not become more fluent with multiple readings of the same passage), and (6) stuttering occurs consistently across various types of speaking settings and environments (Helm-Estabrooks, 1999; Jokel et al., 2007; Tani & Sakai, 2010; Theys, van Wieringen, & De Nil, 2007; & Lundgren, Helm-Estabrooks, & Klein, 2009).

Manning (2010) provided 5 clinical characteristics of neurogenic stuttering, these characteristics supported the clinical characteristics observed by Helm Estabrooks (1999). The characteristics include: (1) no history of previous fluency problems, (2) fluency does not improve during fluency-enhancing conditions (i.e., choral reading, pausing, singing, etc.), (3) sudden or progressive degradation of the client's central nervous system either by disease, illness, or aging, (4) disfluencies can occur on medial and final syllables of words (5) fluency does not improve during automatic speech tasks-like saying the pledge of allegiance, ABC's, or days of the week,.

According to a survey conducted by Griffith (2015), to identify the speech-language pathologists current perception and practice patterns, her results concluded that thirty four out thirty eight Speech Language Pathologists surveyed agreed with Manning, 2010, Nineteen of the 38 participants in the current study agreed with Yairi and Seery's (2011) findings that people with neurogenic stuttering have a poor consistency effect, meaning their disfluent periods cannot be related to a single setting or speaking task.

Literature on Assessment of Neurogenic Stuttering

Various authors have provided framework for assessing neurogenic stuttering and distinguishing it from other disorders. Complete case history reflecting onset, attitudes, medical and family history has to be collected. Medical evidence is very important in the diagnosis of neurogenic stuttering.

Neurogenic stuttering often co-occurs with aphasia and dysarthria (Penttilä & Korpijaakko-Huuhka, 2015). Another study (Konig, 2009) reported that among 60 persons diagnosed with neurogenic stuttering 75% of person with neurogenic stuttering had accompanying speech disorders such as aphasia, dysarthria and apraxia and 50% of person with neurogenic stuttering had aphasia.

Since Neurogenic stuttering often co-occurs with Dysarthria and Aphasia it is very much important to find the core of Neurogenic Stuttering (Penttilä & Korpijaakko-Huuhka, 2015). Direct speech assessment can be done using SSI, speech samples should be assessed in order to assess the dysfluencies on (grammatical words, non-initial syllables), and presence or absence of secondary symptoms, adaptation effect, speaking in variety of fluency inducing conditions should be assessed. Testing for other disorders which may affect the communication and treatment should also be done (Jokel et al. 2007). Lundie et al. (2014) compiled preliminary checklist for accurate diagnosis and intervention of neurogenic stuttering and found that developmental and neurogenic stuttering can co-occur.

A study conducted to identify the current perception and practice patterns of SLPs dealing with neurogenic stuttering cases, survey results concluded that majority of the SLPs believed in using a combination of both traditional dysfluency assessment instruments (SSI-4, OASES) along with assessment of motor speech disorders, aphasia and cognitive disorders in order to identify neurogenic stuttering (Griffith, 2015).

Based on the evidence of characteristic features from various authors and after the several attempts to frame an assessment protocol Manning (2010) developed a battery of tasks and tests (Assessment Battery for Acquired Stuttering in Adults, ABASA) that provide a much clear and complete ideas of the fluency problems. This attempt was to obtain a more detailed understanding of speech fluency problems in neurogenic stuttering.

Literature on Treatment Approaches to Neurogenic Stuttering

The treatment methods traditionally used in developmental stuttering can also be used in case of Neurogenic Stuttering. Selection of treatment approaches and the prognosis in case of neurogenic stuttering will depend upon the underlying neuropathology, fluency diagnosis, health conditions of the individual, cooccurrence of any other disorder etc.

Treatment approaches may include speech modifications (relaxation, speech pacing), block modifications, electromagnetic biofeedback, slow rate and easy onset, stuttering modifications can be used. Devices which enhance speech fluency can also be added such as Delayed Auditory Feedback (DAF), Frequency Altered Feedback (FAF) and Masking. Helm Estabrooks (1999) reported that pacing and DAF would be beneficial for individuals with neurogenic stuttering. Pacing board can slow down the speech rate as the individual move from one word to another by moving his/her fingers. In a case study done by Kuriakose & Thammaiah (2013), they planned individualised treatment plan (pacing, easy onset, precision fluency shaping program, DAF, airflow therapy, soft contact and continual phonation) for a case with neurogenic stuttering. They reported during the course of therapy there was an improvement in the speech rate, fluency as well as speech intelligibility. Post SSI scores also showed remarkable improvement.

Balasubramanian et al. (2010) in their study reported that left motor strip activity can be increased by stuttering therapy. After treatment patients were able to produce speech more automatically and self-corrected. Improving the planning, sequencing and execution should also be taken up as the focus of the treatment.

Koenig (2009) reported that in her survey she found that most of the SLPs believed that easy onset, rhythmical speech and a slow speech rate as well as counselling and desensitisation reduces anxiety in clients with neurogenic stuttering. She concluded that

SLPs achieved success in neurogenic stuttering therapy, only when they combined treatment approaches similar to that of developmental stuttering along with techniques such as easy onsets, rhythmical speech, and slow speech rate. A survey done on SLPs to identify their current perception and patterns on neurogenic stuttering, the results reported that using fluency enhancing techniques, specifically slower rate of speech, controlled pausing and phrasing, easy onset and desensitization got the highest overall average ratings of in between “beneficial” and “very beneficial” in a survey. Easy onset was given an average rating of “somewhat beneficial” and “beneficial” by the SLPs. Less number of SLPs gave ratings for DAF and using board but this was reported as very useful by Helm Estabrooks (1999). Most of them reported that fluency enhancing techniques as useful but none of them given it a rating “most beneficial” (Griffith, 2015).

Table 2.1

Published books on Neurogenic Stuttering

Material	Author	Content
Stuttering and Related Disorders of Fluency 3 rd Edition 2007	Conture & Curlee	This book have a dedicated chapter on neurogenic stuttering. Chapter provides detailed information on terminology, prevalence and incidence, characteristics (etiology and neuroanatomical correlates, speech characteristics, attitudes and emotions, other speech or language problem that can accompany), assessment and treatment (Chapter 17).

<p>A Handbook On Stuttering 6th Edition 2008</p>	<p>Bloodstein & Bernstein Ratner</p>	<p>Provides brief information on causes, fluency symptoms and also provides a tabular form which contains causes, features and site of lesion which were taken from various studies with respect to different cases of neurogenic stuttering (Chapter 4).</p>
<p>Stuttering Foundations and Clinical Applications 2011</p>	<p>Yairi & Serry</p>	<p>Provides brief information on characteristics and differential diagnosis, assessment and treatment of neurogenic stuttering. They have also discussed intervention with respect to a case diagnosed with neurogenic stuttering. (Chapter 15)</p>
<p>Stuttering intervention A Collaborative Journey to Fluency Freedom 2nd Edition 2011</p>	<p>Shapiro</p>	<p>Provides brief information on various attempts to define neurogenic stuttering, it also discuss in detail regarding various etiological factors such as traumatic brain injury, AIDS, stroke, extrapyramidal disease, dementia and tumour and drug usage. Also discuss some case studies (Chapter 4).</p>

Clinical Decision Making in Fluency Disorders 4 th Edition 2018	Manning & DiLollo	Provides brief information on characteristics, assessment procedures, differential diagnosis and treatment procedures (Chapter 11)
Stuttering and Cluttering Framework for Understanding and Treatment 2 nd Edition 2018	Ward	Provides brief information on site of lesion, characteristics, assessment and treatment of neurogenic stuttering (Chapter 17).
Stuttering An Integrated Approach to Its Nature and Treatment 5 th Edition 2019	Guitar	Provides brief information on the nature, diagnosis and evaluation, considerations for treatment and treatment approaches (Chapter 15)

Table 2.2

Published articles on Neurogenic stuttering since last 5 years

Title	Authors	Year	Journal
Characteristics and assessment of acquired stuttering: a clinical guide	Moses	2017	<i>Doctoral Dissertation The University Of Texas</i>
Neurogenic speech sequelae following suicide attempt by hanging: a case report.	Wazeer et al.	2017	<i>International Journal Of Adolescent Medicine And Health, 29(2).</i>
Acquired stuttering in veterans of the wars in Iraq and Afghanistan: The role of	Norman et al.	2018	<i>Military Medicine, 183(11-12), E526-E534.</i>

traumatic brain injury, post-traumatic stress disorder, and medications.

Clozapine-induced weight loss and stuttering in a patient with schizophrenia.	Das et al.	2018	<i>Indian Journal Of Psychological Medicine, 40(4), 385-387.</i>
Emergence of stuttering in an attention deficit hyperactivity disorder patient treated with methylphenidate.	Copur & Copur	2018	<i>Dusunen Adam, 31(2), 222-224.</i>
Neurogenic stuttering: A review of the literature.	Cruz et al.	2018	<i>Rev Neurol 2018;66(2):59-64</i>
Non-speech behaviours in neurogenic stuttering.	Raaphorst	2018	<i>Master Thesis Radboud University</i>
Recovery of brain abscess-induced stuttering after neurosurgical intervention.	Sudo et al.	2018	<i>Case Reports, 2018, Bcr-2017.</i>
Stuttering-like hesitation in speech during acute/post-acute phase of immune-mediated encephalitis.	Dinoto et al.	2018	<i>Journal Of Fluency Disorders, 58, 70-76.</i>
Disfluency clusters in speakers with and without neurogenic stuttering	Penttilä et al.	2019	<i>Journal Of Fluency Disorders, 59, 33-51.</i>

following traumatic brain injury.

Similar within-utterance loci of dysfluency in acquired neurogenic and persistent developmental stuttering.	Max et al.	2019	<i>Brain And Language, 189, 1-9.</i>
Acute Pontine Ischemic Stroke as a Cause of Neurogenic Stuttering.	Santucci et al.	2019	<i>In Annals Of Neurology (Vol. 86, Pp. S51-S51).</i>
Development of stuttering following a sport related concussion in an 18 year-old football athlete: A case study.	Buckner	2019	<i>Scholar Works University Of Montana</i>
Diaphragmatic Breathing for Acquired Neurogenic Stuttering.	Brown	2020	<i>Master Thesis Fontbonne University</i>
Neurogenic stuttering.	Penttilä & Monfrais-Pfauwadel	2020	<i>In Phoniatics Ii.</i>
Case Report of Acquired Stuttering After Soccer-Related Concussion: Functional Magnetic Resonance Imaging as a Prognostic Tool.	Robertson & Diaz	2020	<i>World Neurosurgery, 142, 401-403.</i>

Drug induced stuttering: pharmacovigilance data.	Trenque et al.	2021	<i>Expert Opinion On Drug Safety, 20(3), 373-378.</i>
A case of acute stuttering resulting after a sports-related concussion.	Toldi & Jones	2021	<i>Current Sports Medicine Reports, 20(1), 10-12.</i>
A Case Report of Clozapine- Associated Stuttering and Amisulpride-Associated Stuttering and Seizure in an Adult on Concurrent Fluoxetine Therapy.	Mathur et al.	2021	<i>Journal Of Clinical Psychopharmacology, 41(3), 330-332.</i>

CHAPTER III

METHOD

The main aim of the present study is to develop a clinical tutorial for speech-language pathology students to enhance their knowledge on Neurogenic stuttering that could in turn help in them in the assessment and management of persons with neurogenic stuttering. The current study was also designed to compare the knowledge on neurogenic stuttering between prospective and experienced Speech-Language Pathologists (SLPs). The development of the tutorial was carried out in two phases.

Phase I

- Preparation of script
- Video recording
- Preparation of pre-final video
- Evaluation of pre-final video by Speech Language Pathologists
- Preparation of the final video

Preparation of the script

The current study used a script to better understand neurogenic stuttering. Textbooks, journals, and internet sources were used to research the video module's material. Themes such as introduction to neurogenic stuttering, aetiologies, characteristics, assessment, management of neurogenic stuttering and case demonstrations were all included in the script (Appendix I). All of the themes include a power point presentation, a speaker's narration, case demonstration and a question and answer session.

Video recording

The entire audio video tutorial was videotaped by the Speech-Language Pathologist (SLP) by using a tripod. A silent room with minimum background noise with adequate lighting was chosen for recording. The visual effects in terms of the angle of the shots and the type of the shots were taken care of. The SLP contacted a videographer to determine the quantity of illumination, angle selection, and aspect ratio. Videos were recorded using an iPhone 11. The phone was placed at a distance of approximately 50 centimetres on the table from the mouth of the speaker. The speaker used air pods for better audio clarity. Speaker was recorded with her entire head and neck in the frame, speaker was supposed to stand comfortably and speak on the topic. Re-recording was done when the recorded sample was not as required in the script.

Preparation of pre-final video

The captured videos were taken for post-recording processing or editing when the video recording was completed. The editing was done using videopad, a video editing application. The script board was used to edit all audio and video shots. The edited materials were presented in such a way that the topic was presented in an easy and comprehensible manner. Relevant photos, other videos, background soundtracks, titles and subtitles, easy-to-understand slides, necessary keywords and the voice over were all also merged into the pre-final video.

Evaluation of pre-final video by Speech-language pathologists

The developed video tutorial were provided to three experienced speech-language pathologists in the field of fluency disorders. They were asked to validate the tutorial on the basis of content, visual quality and audio quality. Further modifications were incorporated based on the feedback and suggestions. The content validation was done using

a feedback rating questionnaire (adapted from Field testing of MANAT-K, Goswami et al. (2010) (Appendix II) containing 12 parameters, consisting of a 5 point rating scale. Three speech-language pathologists were asked to validate the tutorial based on this feedback questionnaire.

Preparation of final video

Following the evaluation, SLP's feedback was integrated into the final video. Corrections were made to the pre-final video in the appropriate places. For example the unwanted parts were removed, and the time it took for titles and subtitles to scroll was increased etc. Therefore, the final video was ready to be shown to the participants.

Phase II

- Development of questionnaire for evaluation of audio-video tutorial
- Selection of participants
- Procedure
- Scoring
- Evaluation of results

Development of questionnaire for evaluation of audio-video tutorial

A questionnaire was developed to evaluate the effectiveness of the audio-video tutorial. The questionnaire was administered on the participants both before and after viewing the audio-video tutorial. The questionnaire consists of 25 multiple choice questions (Appendix III). The questionnaire will include questions from various sections such as clinical characteristics, aetiologies, assessment, differential diagnosis and treatment of neurogenic stuttering. The developed questionnaire would aid in getting to know the

knowledge of the speech-language pathology students prior to the presentation of the tutorial and also the post-test questionnaire would aid in the efficacy of the tutorial.

Selection of participants

Prospective and experienced speech language pathologists (SLPs) were considered as the participants in the present study. Prospective SLPs include undergraduate and postgraduate students of the speech, language and hearing discipline (Table 3.1). Experienced SLPs include SLPs who have minimum of 1 year work experience in dealing individuals with communication disorders (Table 3.2). The participants were divided into two groups, group A (prospective SLPs) given in Table 3.1 and group B (experienced SLPs) given in Table 3.2, each consisting of 5 participants.

Table 3.1

Details of participants in group A

Sl. NO	Age/Gender	Year of Course
1	20	II B.ASLP
2	21	III B.ASLP
3	23	INTERN B.ASLP
4	24	II MSc SLP
5	24	II MSc SLP

Table 3.2*Details of participants in group B*

Sl. No	Age/Gender	Qualification	Years of clinical experience
1	24	Masters	1 year
2	27	Masters	3 years
3	26	Bachelors	2 years
4	29	Bachelors	3 years
5	28	Bachelors	1 year

Procedure

Considering the present pandemic situation, a Google Form which consists the questionnaire was sent to all participants through an email. Before watching the audio-video tutorial, the participants were asked to complete a pre-test questionnaire, and then a post-test after watching the audio-video tutorial. Instructions were given in the google form. Participants were asked to mark the correct options in the appropriate columns in the google form. They were given 25 minutes to submit the pre-test questionnaire. After watching the 46 minutes audio-video tutorial they were given another 25 minutes to submit post-test questionnaire.

Scoring

After the administration of the questionnaire, the pre-test and post-test questionnaires were evaluated by speech-language pathologist. Each correct answer was given one mark and each incorrect answer was given 0. No negative marking was present. Total mark out of 25 was calculated.

Evaluation of results

The scores calculated were compared and tabulated for further statistical analysis using Statistical Package Social Sciences (SPSS Version 25). Wilcoxon Signed Ranks test was used to compare pre and post questionnaire scores within each group. Mann-Whitney test was carried out to compare the scores between the two groups. Pre-test and post-test response comparison for each questions in the questionnaire was also carried out without using any statistical analysis.

CHAPTER IV

RESULTS AND DISCUSSION

The objective of the study was to develop a clinical tutorial on neurogenic stuttering for Speech-Language Pathologists (SLPs) and to compare the knowledge on neurogenic stuttering between prospective and experienced Speech-Language Pathologists. A total of 10 Speech-Language Pathologist (5 prospective SLPs and 5 experienced SLPs) participated in the present study. A pre-test and post-test questionnaire (Appendix II) which included 25 multiple choice questions developed for the study was administered. The performance of the participants were evaluated based on pre and post video presentation. The details of the digital tutorial that was developed and its contents are given below.

Phase I: Development of the tutorial

Textbooks, journals, and internet sources were used to research the video tutorial's material. Themes such as introduction to neurogenic stuttering, aetiologies, characteristics, assessment, management of neurogenic stuttering and case demonstrations were all included in the video tutorial. All of the themes include a PowerPoint presentation, a speaker's narration, case demonstration and a question-and-answer session.

Before the development of the final video, script and pre-final video was given to two speech-language pathologists, they were asked to view and suggest feedbacks.

Some of the corrections suggested by the evaluators were:

- To increase the overall volume of the tutorial
- To include more pictures in the introduction
- To maintain uniformity in font size, font style and font colour
- To add keywords wherever necessary

- To add a video of a person with Apraxic stuttering
- To include videos of various treatment approaches
- To correct the order of the contents in the tutorial
- To add source of videos taken from other resources such as Youtube
- To include information on the prevalence of neurogenic stuttering
- To add more information on speech rate

Script for the audio-video tutorial to be recorded was prepared was prepared. Detailed script is provided in the Appendix I. Following table depicts the sample script for the video.

Table 4.1

Sample script prepared for the video

Sl. No	Visual	Audio
1.	<p>Opening slide</p> <p>Logo AIISH followed by</p> <p>Dissertation title “Clinical Tutorial on Neurogenic Stuttering for Speech Language Pathologists”</p> <p>Institute Name</p> <p>Candidate Name</p> <p>Guide Name</p>	<p>“Clinical Tutorial on Neurogenic Stuttering for Speech Language Pathologists”</p>
2.	<p>Stuttering</p> <p>Text slide followed by speaking video of the presenter with subtitles and appropriate images</p>	<p>Fluency is a term that refers to the effortless and smooth flow of speech. Disruption or failure in this smooth flow of speech, leads to various fluency disorders. Stuttering is one such fluency disorder. Stuttering can be classified into developmental stuttering and acquired stuttering.</p>

3.	<p>Acquired stuttering</p> <p>Text slide followed by speaking video of the presenter along with subtitles and appropriate images.</p>	<p>The common type of stuttering is developmental stuttering which is mostly found during childhood. Acquired stuttering is usually seen beyond the typical childhood. Acquired stuttering is a rare condition and is further divided into psychogenic stuttering and neurogenic stuttering based on their etiology. Psychogenic stuttering is characterised by a behavioural dysfunction due to underlying trauma/ emotional or physical stress whereas neurogenic stuttering is a result of an identifiable neurological injury</p>
4.	<p>Speaking video of the presenter along with subtitles and appropriate images.</p>	<p>Neurogenic Stuttering is a condition which occur due to neurological damage. Neurogenic stuttering do not occur in isolation it generally co-occurs with aphasia and dysarthria, therefore it becomes a challenging condition in case of diagnosis and treatment of the disorder.</p> <p>Owing to a lower prevalence rate, the knowledge and understanding of neurogenic stuttering is less in the budding professionals. Hence there is a need to develop a clinical tutorial on Neurogenic Stuttering for SLPs.</p>

The suggestions given by the two speech-language pathologists were incorporated and the final video was developed. The final video was given to three speech-language pathologists for content validation. The evaluators used the questionnaire adapted from feedback rating questionnaire in field testing of MANAT-K (Goswami et al. 2010) for content validation. The evaluators gave ratings after viewing the video tutorial and also gave their comments on the video tutorial.

Qualitative analysis of the Speech-Language Pathologists responses about the overall effectiveness of the audio-video tutorial

Three Speech-Language Pathologists rated the audio-video tutorial based on the feedback questionnaire developed by Goswami et al. (2010), as shown in the table

Table 4.2*Response of the speech-language pathologists regarding the video tutorial*

Sl. No	Parameters	Very Poor	Poor	Fair	Good	Excellent
1	Simplicity				2	1
2	Size				2	1
3	Color and appearance			1	1	1
4	Presentation				3	
5	Volume				3	
6	Relevance				3	
7	Iconicity			1	1	1
8	Accessibility				3	
9	Trainability				2	1
10	Publication, outcomes and developers		Yes			No 3
11	Questionnaire				2	1
12	Coverage of parameters				2	1

It is evident from the Table 4.2 that one speech-language pathologist rated that the size, colour and the appearance of the tutorial as “excellent”. One speech-language pathologist

rated “excellent” in terms of simplicity, iconicity, trainability, questionnaire and coverage of parameters.

Three speech-language pathologists rated the tutorial as “good” for the parameters presentation, volume, relevance and accessibility. Two speech-language pathologists rated the tutorial as “good” in terms of simplicity, size, trainability, questionnaire and coverage of parameters. One speech-language pathologist rated the video tutorial as “good” in terms of the parameters colour & appearance and iconicity.

One speech-language pathologist rated the tutorial as “fair” on colour and appearance and iconicity. Also for the publication, outcomes and developers all three speech-language pathologists responded that they were not aware of any other resource material similar to this video tutorial available for neurogenic stuttering.

Two of the SLP provided feedback that the video tutorial was comprehensive and can serve as a good source for speech-language pathologists to gain knowledge on neurogenic stuttering. The sections were clear and well organized. One of the SLP commented that the tutorial has good practical demonstration of samples related to neurogenic stuttering in Indian context. All the three speech-language pathologists commented that the questions in the questionnaire were appropriate and would help in assessing the understanding of the video tutorial.

Therefore, from the above table 4.2 it can be stated that this video tutorial received grading such as excellent, good and fair from most of the evaluators. Majority of the ratings by speech-language pathologists were falling under “good”. Therefore, the speech-language pathologists were of the opinion that this video tutorial can be used effectively for training students of speech-language pathology and can be used as reference tool.

Comments from all the three speech pathologists were noted down and wherever required necessary changes were incorporated.

Contents of the final video tutorial:

The overall tutorial duration is about 46 minutes. The tutorial begins with definition of stuttering, types of stuttering, objectives of the study, introduction to neurogenic stuttering, prevalence, aetiology followed by question and answers to assess the immediate understanding of the speech-language pathologists.

The second section provide information about the informal assessment that can be carried out, starting from case history which can be collected from the client as well as his/her communication partners. This is followed by a brief description about the characteristics observed in persons with neurogenic stuttering. Formal assessment was explained using ABASA (Assessment battery for acquired stuttering in adults), ABASA included sections such as testing of general functions, speech fluency assessment and self-assessment of attitudes. This was followed by assessment of speech rate and related case samples. Information with respect to how to analyse the speech dysfluencies and characteristics was also provided. The case samples demonstrating the characteristics were obtained from the audios and videos of persons with neurogenic stuttering available in Fluency unit, AIISH.

Third section included information and case samples on classification of neurogenic stuttering (Canter, 1971). The section included one video each of dysarthric, apraxic and dysnommic stuttering. Two videos were collected from Fluency unit, AIISH and one video from Youtube. This was followed by differential diagnosis where a table that lists the differences between developmental stuttering and neurogenic stuttering, which would help in differentially diagnosing the two conditions. Two Youtube videos each of persons with

developmental stuttering and neurogenic stuttering was also included to provide a clearer understanding of the features. Question and answer section was also included to assess the immediate understanding of the speech-language pathologists.

The fourth section included information on the treatment for persons with neurogenic stuttering. This section included information on various approaches that can be used such as behavioural, medical and surgical. Additionally, techniques such as pacing, auditory masking and delayed auditory feedback, electromyographic biofeedback, slow rate and easy onset were included. Information was also included on the importance of caregiver involvement, neurosurgery and medication as well. Also included were three case samples, one was collected from the Fluency unit, AIISH demonstrating how to use a pace board and to slow down the speech. Two videos were collected from the Youtube one was a video demonstrating the usage of electromyographic biofeedback and other one was related to delayed auditory feedback. Question and answer section was also included to assess the immediate understanding of the speech-language pathologists of the section.

The final section consisted of the conclusion, a brief mention on how the video can serve as a reference tool for speech-language pathologists to handle persons with neurogenic stuttering. This was followed by the acknowledgement slide.

The final tutorial video was saved in DVD and pen drive for easier access.

Phase II: Field testing of the video tutorial

Quantitative analysis of effectiveness of the audio video tutorial on knowledge of neurogenic stuttering among prospective and experienced speech-language pathologists;

As part of this phase, a total of ten participants were selected. Group A consisted of five participants (prospective speech-language pathologists) and Group B consisted of five participants (experienced speech-language pathologists). Each participant had to complete

pre-test questionnaire before viewing the tutorial and post-test questionnaire after viewing the tutorial. The scores were calculated for each participant. Data was tabulated and statistically analysed using SPSS Version 25. Since the sample size collected was small, test of normality was not carried out and non-parametric tests were used. Wilcoxon signed rank test was used to compare pre-test and post-test scores within each group. Mann-Whitney test was carried out to compare the scores between the two groups (prospective and experienced speech-language pathologists).

The results of the quantitative analysis are under the following sub headings:

- a) Comparison of pre-test and post-test questionnaire scores within speech-language pathologists.
- b) Comparison of pre-test and post-test questionnaire score within prospective speech-language pathologists
- c) Comparison of pre-test and post-test questionnaire scores with experienced speech-language pathologists
- d) Comparison of pre-test and post-test questionnaire scores between prospective and experienced speech-language pathologists.
- e) Comparison of pre-test and post-test response for each questions in the questionnaire.

a) Comparison of pre-test and post-test questionnaire scores within speech-language pathologists

Wilcoxon signed rank test was used to compare the pre-test and post-test questionnaire scores within speech-language pathologists. Results indicated a significant difference between pre-test and post-test questionnaire scores within speech-language pathologists ($|Z|=2.812$, $p<0.01$). Overall, it was found that in pre-test questionnaire

speech-language pathologists attained a lowest score of 8 and a highest score of 19 out of 25. In post-test questionnaire speech-language pathologists obtained a lowest score of 19 and a highest score of 24 out of 25. Only two speech-language pathologists scored less than 20 in post-test conditions. The results depicts that the developed video tutorial was useful for the speech-language pathologists. The video tutorial enhanced their learning and improved their knowledge in the topic of neurogenic stuttering.

Table 4.3

Pre-test and post-test scores within SLPs

	Pre-test score
	Post-test
Z	2.812
Asymp.Sig (2 tailed)	0.005*

Note. *=**Significant difference at 0.01 level**

b) Comparison of pre-test and post-test questionnaire score within prospective speech-language pathologists

In prospective speech-language pathologists, Wilcoxon signed rank test was done to compare the pre-test and post-test questionnaire scores within prospective speech-language pathologists. The results indicated that there is a significant difference between the pre-test and post-test questionnaire scores ($|Z|=2.023$, $p<0.01$). Overall, it was found that in pre-test questionnaire speech-language pathologists attained a lowest score of 8 and a highest score of 15 out of 25. In post-test questionnaire speech-language pathologists obtained a lowest score of 19 and a highest score of 22 out of 25. A trend was observed that with increase in number of years of study, there was an increase in the pre-test scores obtained among the prospective SLPs; this trend shows

that there was effect of experience on the pre-test scores. Only one prospective speech-language pathologists scored less than 20 in post-test conditions. The results depicts that the developed video tutorial was useful for the speech-language pathologists. The video tutorial enhanced their learning and improved their knowledge in the topic of neurogenic stuttering.

Table 4.4

Comparison pre-test and post-test scores within prospective SLPs

	Pre-test score
	Post-test
Z	2.023
Asymp.Sig (2 tailed)	0.043*

Note. *=**Significant difference at 0.01 level**

c) Comparison of pre-test and post-test questionnaire scores within experienced speech-language pathologists

In experienced speech-language pathologists, Wilcoxon signed rank test was done to compare the pre-test and post-test scores within experienced speech-language pathologists. The results showed that there is a significant difference between pre-test and post-test scores within experienced speech-language pathologists ($|Z|=2.041$, $p<0.01$). Therefore from this result it is very evident that the video tutorial has an effect on the pre-test and post-test scores. Overall it was found that in pre-test, experienced speech-language pathologists obtained lowest score of 13 and highest score of 19 out of 25. In the post-test scores speech-language pathologist obtained a lowest score of 19 and a highest score of 24 out of 25. It appears that pre-test scores were not affected by experience, but this was dependent on the specific kind of cases that were handled during the work life. For example the SLP with 1 year of experience but who had handled cases with neurogenic stuttering in this time had better scores than the SLP

who had three years of experience and with no such exposure. Only one of the experienced speech-language pathologists obtained a score of less than 20 in post-test. The results depict that the developed video tutorial was useful for the experienced speech-language pathologists. The video tutorial enhanced their learning and improved their knowledge on the topic of neurogenic stuttering. It also helped the professionals who had minimal exposure in assessing and treating persons with neurogenic stuttering.

Table 4.5

Comparison of pre-test and post-test scores within experienced SLPs

	Pre-test score
	Post-test
Z	2.041
Asymp.Sig (2 tailed)	0.041*

Note. *=**Significant difference at 0.01 level**

d) Comparison of pre-test and post-test scores between prospective and experienced speech-language pathologists.

To compare pre-test and post-test questionnaire scores between prospective speech-language pathologists and experienced speech-language pathologists, Mann Whitney test was used. In pre-test questionnaire scores when compared between prospective and experienced speech-language pathologists, the results showed that there is significant difference between the pre-test scores of prospective and experienced speech language pathologists ($|Z|=2.095$, $p<0.01$). This difference occurred as experienced speech-language pathologists might have had more theoretical and clinical exposure when compared with prospective speech-language pathologists. Their years of experience had an effect on the pre-test scores in both the groups.

In post-test (after viewing the tutorial) questionnaire scores, the results showed that there is no significant difference between prospective and experienced speech-language pathologists ($|Z|=0.423$, $p>0.01$). This results shows that both the groups were equally capable to score after going through the video tutorial. This shows that the video tutorial was easily comprehensible for both the groups and the experience of one group didn't make any advantage in understanding and comprehending the tutorial. Therefore, this video tutorial can be used for student training purpose as well as a reference tool by the prospective and experienced speech-language pathologists.

Table 4.6

Comparison of pre-test and post-test scores between prospective and experienced SLPs

	Pre-test score	Post-test score
Z	2.095	0.423
Asymp. Sig (2-tailed)	0.036*	0.672

Note. *=**Significant difference at 0.01 level**

e) Comparison of pre-test and post-test response for each questions in the questionnaire.

Question No.s 2,4,5,6,10,14,15,20,21,22

In question no. 2,4,5,6,10,14,15,20,21,22 all the ten speech-language pathologists provided correct response in the post-test condition. In the pre-test questionnaire in question no. 2, six out ten SLPs provided correct response and four out of ten SLPs provided incorrect response; in question no. 4, five out of ten SLPs provided correct response and five out ten SLPs provided incorrect response; question no. 5, four out of ten SLPs provided correct response and six out of ten SLPs provided incorrect response; question no. 6, eight out of ten SLPs provided correct response and two out of ten SLPs provided incorrect response; question no.10, six out of ten SLPs provided correct

response and four out of ten SLPs provided incorrect response; question no.14, one out of ten SLPs provided correct response and nine out of ten SLPs provided incorrect response; question no.15, eight out of ten SLPs provided correct response and two out of ten SLPs provided incorrect response; question no.20 & question no.21, seven out of ten SLPs provided correct response and three out of ten SLPs provided incorrect responses and question no.22, six out of ten SLPs provided correct responses and four out of ten SLPs provided incorrect responses.

Question No.s 1, 3, 7, 8, 9, 11, 12, 13, 16, 18, 24 & 25

In pre-test condition for question no.1, eight out of ten SLPs provided correct responses and in post-test nine out of ten SLPs provided correct response; question no.3, three out of ten SLPs provided correct responses and nine out of ten SLPs provided correct responses in the post-test. In pre-test for question no.7, five out of ten SLPs provided correct responses and six out of ten SLPs provided correct responses in post-test condition; question no.8, question no.9 & question no.11, two out of ten SLPs provided correct responses in pre-test and seven out of 10 SLPs provided correct response in post-test. In pre-test two out of SLPs provided correct response and in the post-test four out of ten SLPs provided correct response. Question no.13 eight out of ten SLPs provided correct responses; question no.16 & question no. 25 six out of ten SLPs provided correct response in pre-test and nine out of ten SLPs provided correct response; in question no.13 & 16, eight out of ten SLPs provided correct response in the post-test. In Question no. 18 & question no. 24, five out of ten SLPs provided correct responses in pre-test and eight and seven, respectively, out of ten SLPs provided correct response in the post-test. In post-test SLPs performance were better and scored more compared to pre-test scores. The results shows that the video tutorial could enhance

their knowledge and helped them in improving their performance in the post-test questionnaire.

Question 17, 19 & 23

In pre-test condition for the question no.17, all the ten speech language pathologists provided correct responses and in the post-test one SLP failed to give the correct response. In Question no.19 seven out of ten provided correct responses in the pre-test and one SLP failed to provide correct response in the post-test condition. In Question no.23, nine out of ten SLPs provided correct response and two out of ten SLPs failed to provide correct response in the post-test condition. This might have happened as they were confused between the options provided in the multiple choice questions.

Thus, based on the results, a trend in the performance of the participants was evident indicating that this developed video does have a strong foundation for training the speech-language pathologists. Cognitivists believed that the addition of multimedia can improve and augment the learning process of students as well as professional as they see the concepts in action (Michelich, 2002). By using visual and auditory messages, students can process the information quicker, which turn fosters their learning and acquisition of material. This is the first video of its kind which has been developed for neurogenic stuttering. The user validation and content validation using questionnaire helped to state its educational and clinical base. Further, it will be very helpful during pandemic situation where students have to rely more on online educational programs and self-learning. This video tutorial can be used both by prospective and experienced speech-language pathologists as well as educators for better teaching and learning opportunities. Hence, current study highlights the importance and need to develop digital tutorial for disorders to which SLPs have minimal exposure.

CHAPTER V

SUMMARY AND CONCLUSION

Having a thorough understanding of neurogenic stuttering is very much important for SLPs due to various reasons. The first reason is that even though the prevalence of neurogenic stuttering is low, it is not uncommon for the Speech Language Pathologists working in the medical setup to have neurogenic stuttering in their case load. Second reason is that persons with neurogenic stuttering have communication problem in their day to day life and also in their immediate environment just like the persons with developmental stuttering. Therefore, persons with neurogenic stuttering also have the right to undergo best evidence based practice for improving their fluency just like the person with neurogenic stuttering. Third reason is that there is also a need to understand whether the developmental stuttering and acquired stuttering are same or different in order to differentially diagnose them. There is thus a need to understand the underlying neuropathology, emotional problems and onset of stuttering like dysfluencies in both neurogenic stuttering as well as developmental stuttering.

Video tutorials, animation video and documentary films plays a major role in educating complex concepts in simpler form, educating public and awareness. Video tutorials have been widely used in educational set-ups and also for self-learning. Video tutorials can include practical demonstration of various concepts and topics. It is very necessary to develop a video tutorial on the topic of neurogenic stuttering by using audio-video samples of persons with neurogenic stuttering. These tutorials help clinicians to deal with neurogenic stuttering cases appropriately. It will serve as a reference tool for clinicians dealing with neurogenic stuttering cases.

Thus the present study was aimed to develop and validate an audio-video tutorial on neurogenic stuttering for speech-language pathologists (SLPs), to improve their knowledge and understanding of the disorder.

The development of the tutorial was carried out in two phases. The first phase included preparation of script, video recording, preparation of pre-final video, evaluation of the pre-final video by speech-language pathologists and preparation of the final video. The second phase was field testing of the developed tutorial which included development of questionnaire for evaluation of the video tutorial, selection of participants, procedure, scoring and evaluation of the results. The present study included 10 participants. Participants were divided into 2 groups (group A and group B) group A included 5 students of speech-language pathology and group B included 5 experienced SLPs who have a minimum of 1 year experience in the field of speech-pathology. The developed questionnaire contained 25 multiple choice questions related to neurogenic stuttering and participants answered the questionnaire both before and after viewing the tutorial. Correct response was scored as 1 and incorrect as 0.

Data was tabulated and analysed using SPSS (Version 25) software. Wilcoxon signed rank test was used to compare the pre-test and post-test questionnaire scores within speech-language pathologists, within prospective SLPs and within experienced SLPs. Mann Whitney test was used to compare the pre-test and post-test questionnaire scores between prospective and experienced SLPs. The findings of the study showed that there is an overall improvement in the post-test scores.

The finding of the study indicated that there was an overall improvement in post-test scores when compared to pre-test scores and this showed a significant difference. This trend was observed within the prospective and within the experienced SLP groups.

However, there was no significant difference noted in the pre-test and post-test performance between the two groups. The results depict that the developed tutorial was useful for the SLPs. It enhanced their learning and improved their knowledge on neurogenic stuttering gained during theory and clinical practicum classes. It was also observed there was a good improvement in response to questions from pre-test to post-test performance.

In conclusion, results of the present study indicated a significant improvement in the SLPs performance after the viewing of the audio-video tutorial on neurogenic stuttering. It shows that the tutorial is beneficial in facilitating better understanding of concepts for the SLPs.

Implication

1. The tutorial would help the speech-language pathologists to have an overall understanding of neurogenic stuttering in the clinical set up.
2. It would provide relevant clinical samples or case histories of persons with neurogenic stuttering, providing a correlation with theory and practical knowledge.
3. It would aid in early identification of the disorder.
4. It would help speech-language pathologists to understand about the associated conditions such as dysarthria, aphasia and apraxia.
5. Speech-language pathologists would be able to differentially diagnose between developmental & neurogenic stuttering and also between dysarthric, dysnomic and apraxic stuttering.
6. It would help the speech-language pathologist in understanding about the strategies that be used in treating persons with neurogenic stuttering.
7. With the help of this tutorial speech-language pathologists would be able to handle persons with neurogenic stuttering with greater confidence.

Future directions

1. The study can include large sample size to demonstrate any significant difference between the two groups.
2. Some more case samples of persons with neurogenic stuttering indicating stuttering seen with other medical conditions can also be included.
3. Can include samples of assessment and treatment of the same client in detail.
4. The years of experience required by professional SLP can be more to assess if there is any significant effect of experience on knowledge.
5. A longitudinal study can be considered after a month or six months to study increase in knowledge on neurogenic stuttering.
6. The tutorial can include samples for assessment and treatment strategies to further get holistic view about neurogenic stuttering.

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Appendix I

Script Board For The Clinical Tutorial On Neurogenic Stuttering For Speech Language Pathologists

Sl. No	Visual	Audio
1.	<p>Opening slide Logo AIISH followed by Dissertation title “Clinical Tutorial on Neurogenic Stuttering for Speech Language Pathologists” Institute Name Candidate Name Guide Name</p>	<p>Clinical Tutorial on Neurogenic Stuttering for Speech Language Pathologists</p>
2.	<p>Stuttering Text slide followed by speaking video of the presenter with subtitles and appropriate images</p>	<p>Fluency is a term that refers to the effortless and smooth flow of speech. Disruption or failure in this smooth flow of speech, leads to various fluency disorders. Stuttering is one such fluency disorder. Stuttering can be classified into developmental stuttering and acquired stuttering.</p>
3.	<p>Acquired stuttering Text slide followed by speaking video of the presenter along with subtitles and appropriate images.</p>	<p>The common type of stuttering is developmental stuttering which is mostly found during childhood. Acquired stuttering is usually seen beyond the typical childhood. Acquired stuttering is a rare condition and is further divided into psychogenic stuttering and neurogenic stuttering based on their etiology. Psychogenic stuttering is characterised by a behavioural dysfunction due to underlying trauma/ emotional or physical stress whereas neurogenic stuttering is a result of an identifiable neurological injury</p>
4.	<p>Speaking video of the presenter along with subtitles and appropriate images.</p>	<p>Neurogenic Stuttering is a condition which occur due to neurological damage. Neurogenic stuttering do not occur in isolation it generally co-occurs with aphasia and dysarthria, therefore it becomes a challenging condition in case of diagnosis and treatment of the disorder.</p>

		Owing to a lower prevalence rate, the knowledge and understanding of neurogenic stuttering is less in the budding professionals. Hence there is a need to develop a clinical tutorial on Neurogenic Stuttering for SLPs.
5.	<i>Objective</i> Text slide	To develop a clinical tutorial on Neurogenic Stuttering for Speech-Language Pathologist. To validate the content of the tutorial. To compare the knowledge on Neurogenic Stuttering between prospective SLPs and experienced speech Language Pathologists.
6.	Neurogenic stuttering Text slide followed by speaking video of the presenter with subtitles	The term “neurogenic stuttering” was coined by Canter in 1971. The neurogenic stuttering is defined as a stuttering associated with the acquired neurological disorders (SAAND). It is an acquired or reacquired disorder of fluency characterised by notable, involuntary repetitions or prolongations of speech that are not the result of language formulation or psychiatric problems. Canter classified the neurogenic stuttering into three subgroups (dysarthric stuttering, apraxic stuttering and dysnomic stuttering). Limited studies are available on the incidence and prevalence of neurogenic stuttering.
7.	Prevalence Text slide followed by voice over of the clinician with suitable pictures and subtitles	Theys et al, (2011) reported that in a study conducted on stroke patients 17 out of 319 participants had neurogenic stuttering leading to an incidence of 5.3%. In Indian scenario the identification of neurogenic stuttering is happening late and the prevalence is less. ARF project titled AIISH survey of fluency disorders (2014-15) analysed 5 years data (2010-14) and stated that among the clients with fluency disorders 96.8% were identified as having developmental stuttering, 0.4% as neurogenic stuttering, 0.2% as stuttering-cluttering and 0.5% as cluttering.
8.	Etiologies	Neurogenic stuttering may be caused due to various etiologies, CVA (cerebrovascular accidents) is one of the major etiology. Other etiologies: acute conditions such as

	Text slide followed by voice over with related pictures	(TBI, stroke, drugs, neurosurgery), degenerative conditions such as (parkinsons disease, dementia, brain tumors) and other rare causes may often include dialysis, seizures, bilateral thalamotomy or thalamic stimulation
9.	Questions Text slide with voice over of the presenter	<p><u>Fill in the blanks</u></p> <ol style="list-style-type: none"> 1. Canter classified neurogenic stuttering into -----, -----, and -----. 2. Neurogenic stuttering is characterised by notable, involuntary repetitions or prolongations of speech that are not the result of ----- and ----- problems. <p><u>True or false</u></p> <ol style="list-style-type: none"> 1. Adaptation effect is present in individuals with Neurogenic stuttering 2. No previous fluency problem is a prerequisite to diagnose with neurogenic stuttering 3. Expansion of SAAND is stuttering acquired with associated neurogenic disorders.
10.	Answers Text slide with answers	<p><u>Fill in the blanks</u></p> <ol style="list-style-type: none"> 1. Dysarthric, dysnomic and apraxic stuttering 2. Language formulation and psychiatric problems <p><u>True or false</u></p> <ol style="list-style-type: none"> 1. False 2. True 4. False
11.	Assessment Text slide followed by video of the presenter speaking on the topic	Neurogenic stuttering can manifest itself in many different ways depending on several factors, including the nature of the associated disorder, the underlying etiology and the time of onset. The assessment of neurogenic stuttering is highly individualized since the individual may exhibit speech fluency problem along with dysarthria, aphasia and other motor and cognitive problems.
12.	Case history Text slide followed by picture of case file with	According to the battery the clinician have to take a detailed case history which includes:

	<p>case history and voice over</p>	<p>Medical history, including neuroimaging data (structural and functional)</p> <p>Social and occupational history</p> <p>Personal/family speech and language history and current status</p> <p>Detailed history and current status of disfluencies (onset and development)</p> <p>Self-reported awareness of stuttering severity and secondary behaviours</p>
<p>13.</p>	<p>Characteristics</p> <p>Text slide followed video sample of persons with neurogenic stuttering exhibiting some of these characteristics.</p> <p>Video will be played and specific characteristics will be highlighted using subtitle.</p> <p>(videos are collected from fluency department of AIISH and from youtube)</p>	<p>Various literature recognises differential speech characteristics of neurogenic stuttering which are</p> <ul style="list-style-type: none"> • history of previous fluency problems not present • sudden or progressive degradation of the client’s central nervous system either by disease, illness, or aging • disfluencies present on both function and content words • annoyance but no anxiety is present with respect to speaking • disfluencies consisting of repetitions, prolongations, and blocks can occur at any position of the word or utterance • secondary symptoms (i.e., facial grimacing, eye blinking, or fist clenching) do not occur during moments of stuttering • there is no adaptation effect (the speaker will not become more fluent with multiple readings of the same passage) • fluency does not improve during fluency-enhancing conditions (i.e., choral reading, pausing, singing, etc.) • fluency does not improve during automatic speech tasks-like saying the pledge of allegiance, ABC’s, or days of the week • stuttering occurs consistently across various types of speaking settings and environments.

		Now let's appreciate these characteristics in speaking videos of persons with neurogenic stuttering.
14.	<p>Assessment battery for acquired stuttering in adults (ABASA)</p> <p>Text slide followed by speaking video of the presenter.</p> <p>Text slide of ABASA contents.</p>	<p>Here I will explain the assessment of neurogenic stuttering using an assessment battery for acquired stuttering in adults (ABASA). This battery was developed by Manning (2010) to obtain a more detailed understanding of the speech fluency problems in a person with suspected neurogenic stuttering. This battery contains tasks and test that can give us a more complete picture of the fluency problems. Depending on the unique nature of each client, not all of these tests or tasks need or can be administered.</p> <p>The ABASA elements include:</p>
15.	<p>Testing of general functions</p> <p>Text slide followed by showing results of language and speech assessment of case files of persons with neurogenic stuttering associated with aphasia, apraxia, dysarthria etc</p>	<p>Neurogenic stuttering often co-occurs with aphasia and dysarthria therefore testing of general language functions is very much important in the assessment.</p> <p>Clinician to assess for the language, speech and cognition of suspected individuals</p> <p>To check language WAB-R can be used. Speech assessment can be done using FDA, ABA and Motor speech examination. Here assessment done using FDA for a person with neurogenic stuttering is shown.</p> <p>Cognition can be assessed using MMSE</p> <p>Soft neurological signs can be asessed using QNST</p> <p>Vocabulary will be assessed using action naming test</p>
16.	<p>Speech Fluency Assessment</p> <p>Text slide followed by video samples of PWNS doing these tasks</p> <p>video will be shown</p>	<p>The frequency and type of dysfluencies should be determined in a variety of reading and spontaneous speech conditions.</p> <ul style="list-style-type: none"> • Reading: single words, short sentences and paragraph • Spontaneous speech: monologue, conversation (minimum 200 syllables) • The Stuttering severity instrument (SSI) should be administered and the speech should be video

	<p>Video of how analysis done will also be shown using video sample of a case.</p>	<p>recorded during conversation and video reading samples.</p> <p>Stuttering in speech samples should be analysed for proportion stuttering on function words versus content words</p> <ul style="list-style-type: none"> ○ <i>More stuttering on function words suggests neurogenic</i> but stuttering will be seen in both function and content words ○ <i>More stuttering on non-initial syllables suggests neurogenic stuttering (e.g: excitement, black-b-b-board).</i>
17.	<p>Speech rate</p> <p>Text slide</p> <p>Followed by slides with information and voice over</p>	<p>Overall speaking rate (in syllables per minute)</p> <p>In overall speaking rate, the entire duration of speech including disfluencies (pauses, prolongation and other interruptions) will be considered to measure. The number of syllables or words produced is calculated and divided by the duration (in minutes). The iterations should be removed, as they can affect the counting of linguistic units</p> <p>The usual rate of speech is an average of 6-7 syllables per second or 80-180 words per minute</p>
18.	<p>Case sample</p> <p>Text slide followed by picture of case history proforma with voice over.</p> <p>Videos of 2 persons with neurogenic stuttering will be displayed, keywords of the type of dysfluency will be highlighted.</p>	<p>2 video samples of person with neurogenic stuttering will be played.</p>
19.	<p>Self-Assessment of Attitudes</p> <p>Text slide followed by the picture of the locus control of behaviour</p>	<p>Locus control of behaviour (LCB) can be used for self-assessment of attitudes.</p> <p>The locus control of behaviour (LCB) is one such scale that is used to differentiate between internal and external personality types. Knowing the attitudes of an individual</p>

	(LCB) format will be shown	is very much important for treatment prognosis. Based on the scores on LCB clinician can counsel the person with neurogenic stuttering.		
20.	Differential diagnosis Text slide followed by voice over of the presenter with keywords. Video sample of person with developmental stuttering and neurogenic stuttering.		Developmental stuttering	Neurogenic stuttering
		Etiology	Probably neurophysiological (anomalies in left hemisphere) exacerbated by temperament and environment	stroke, head trauma, tumor, disease process, drug toxicity, dialysis, dementia seizure disorder, bilateral thalamotomy, thalamic stimulation
		Onset	Usually ages 2-5, with some onset in school years	Usually after childhood following a neurological event however in rare cases stuttering could be the first sign of a neurological problem
		Speech characteristics	Single-syllable whole word repetitions, part word repetitions, prolongation and blocks. Frequency is usually more than 3% syllables stuttered. Secondary behaviors (escape and avoidance)	Stuttering appears on function as well as content words, stuttering not restricted to word initial syllables, absence of secondary behaviors, little

			common. Pattern varies somewhat.	adaptation in repeated readings, stuttering not markedly reduced in fluency-inducing conditions
		Client's concern level	Client typically shows frustration and embarrassment about stuttering as well as fear of speaking	Client may be annoyed or frustrated, but not fearful or anxious about stuttering
21.	Text slide followed by video sample of person with dysarthric stuttering, apraxic stuttering and dysnomic stuttering will be shown. Later a flowchart showing differences will be put.	<p>Apraxic stuttering: Apraxic stuttering can be caused by a fundamental difficulty with motor planning. As the speaker tries to sequence the necessary speech gestures, there are silent blocks and repetitions. The speaker's attempt to remedy articulation or movement faults is reflected in the sound repeats and prolongations. The speaker's repeated use of the correct first sound or word implies that he or she was not attempting to self-correct. These repetitions, similar to prolongations of a valid sound, may be caused by an inability to deliberately trigger the motor speech mechanism, and are appropriately referred to as apraxic neurogenic stuttering.</p> <p>Dysnomic stuttering: Dysnomia is a condition in which people have trouble remembering words. It is caused by injury to the left dominant hemisphere and is part of the aphasia syndrome, which affects reading, writing, comprehension, and even gesturing. Dysnomic stuttering sometimes Accompanies aphasia. Stuttering symptoms occur as an individual searches for the word he is having trouble retrieving.</p> <p>Dysarthria is a term used to describe a set of motor speech problems caused by injury to the central or peripheral nerve systems. Frequent prolongations with a resulting disruption of speech flow, equating to "Articulatory freezing," rapid syllable, word, and phrase</p>		

		repetition, equating to "effortless," and "Long silent blocks"
22.	<p>Questions</p> <p>Text slide of questions voice over of the presenter will be given</p>	<p><u>Fill in the blanks</u></p> <ol style="list-style-type: none"> 1. If fluency inducing conditions do not ----- fluency, this suggests neurogenic stuttering 2. -----battery can be used in assessment of neurogenic stuttering. <p><u>True or false</u></p> <ol style="list-style-type: none"> 1. Adaptation effect is seen persons with neurogenic stuttering 2. LCB is used to assess adaptation effect. 3. More stuttering on non-initial syllables suggests neurogenic stuttering
23.	<p>Answers</p> <p>Text slide of answers</p>	<p><u>Fill in the blanks</u></p> <ol style="list-style-type: none"> 1. Increase 2. ABASA <p><u>True or false</u></p> <ol style="list-style-type: none"> 1. False 2. False 3. True
24.	<p>Treatment</p> <p>Text slide followed by the presenter speaking on the topic along with subtitles. Keywords will be shown</p>	<p>Persons with neurogenic stuttering do not usually have the cognitive and emotional aspects that define developmental stuttering in adulthood, treatment is frequently solely behavioral. An exception is when the neurological etiology of the stuttering is recognised and can be cured by surgery or medications. Therefore treatment approaches for neurogenic stuttering can be divided into three i.e, Behavioural, Neurosurgery and Medication.</p> <p>Selection of treatment approaches and the prognosis in case of neurogenic stuttering will depend upon the underlying neuropathology, fluency diagnosis, health conditions of the individual and co-occurrence of any other disorder</p>

25.	<p>Behavioural treatments</p> <p>Text slide followed by slide of various behavioural treatment methods</p>	<p>The treatment methods traditionally used in developmental stuttering can also be used in case of Neurogenic Stuttering. The behavioural treatment methods that are used in neurogenic are pacing, auditory masking and delayed auditory feedback, slow rate and easy onset and stuttering modifications.</p> <p>In some cases, the neurological problem will be transient as person recovers in speech and language aspects, fluency problem subsides.</p>
26.	<p>Text slide with voice over</p>	<p>The behavioural treatment methods used in neurogenic stuttering:</p> <ul style="list-style-type: none"> ➤ Pacing ➤ Auditory masking and delayed auditory feedback ➤ Slow rate and easy onset
27.	<p>Pacing</p> <p>Text slide followed by video of an individual using pacing board.</p> <p>Pictures of various pacing devices will also be shown.</p>	<p>This is a technique of speaking one syllable at a time. Therefore, the coarticulation effect can be reduced. This treatment was originally developed by Helm (1979) to use with individuals having Palilalia. In individuals who have difficulty in slowing their speech pacing board can be used. Pacing device can be used initially and progress to rhythmically tapping on the thigh.</p> <p>Devices such as chorus speaking and metronome can also be used.</p>
28.	<p>Auditory masking and Delayed auditory feedback</p> <p>Text slide followed by video of an individual using the same collected from youtube</p>	<p>Auditory masking and DAF can be used as therapeutic tools to induce fluency in persons with neurogenic stuttering. The patient might have to go through 1 hour treatment for 2-3 times per week.</p> <p>Using DAF the clinician will provide the feedback of persons own speech after a delay of time.</p>
29.	<p>Slow rate and easy onset</p> <p>Text slide followed by video of the clinician</p>	<p>Since word finding is a common problem in neurogenic fluency disorders and may contribute to fluency breaks, a slow rate of speech production may also assist the speaker by providing more time for retrieval.</p>

	demonstrating the same and the patient using the same.	
30.	<p>Electromyographic biofeedback for tension reduction</p> <p>Text slide followed by visuals of an individual using the same.</p>	<p>Training patients to relax muscles with the help of biofeedback can be effective in reducing neurogenic stuttering.</p>
31.	<p>Neurosurgery and Medication</p> <p>Text slide</p> <p>Suitable pictures along with the speaker speaking about the topic</p>	<p>When a neurological condition necessitates surgery, the procedure can resolve or improve structuring. Cases in the literature indicate that surgery that resolves a neurological disorder can also resolve stuttering. Implanting electrodes for stimulation of the left centromedian muscles of the thalamus, i.e thalamic stimulation has also been suggested in the literature to eliminate stuttering. Drugs for reducing the symptoms have in turn helped in relieving the stuttering. Drugs such as injection of sumatriptan, anticonvulsants and paroxetine are commonly used. Literature give evidence that the administration of paroxetine to a patient with acquired stuttering following stroke completely eliminated stuttering within 1 month of starting the treatment.</p>
32.	<p>Caregiver involvement</p> <p>Text slide followed by related pictures</p>	<p>Caregiver involvement is very much important in the assessment and management of neurogenic stuttering. During assessment caregiver can give detailed information regarding previous investigation and histories if the client misses out. During treatment they can help in providing feedback to the client and also in generalisation</p>
33.	<p>Questions</p> <p>Text slide of questions to check the understanding of the listeners on the specific topic</p>	<p><u>Fill in the blanks</u></p> <ol style="list-style-type: none"> 1. ----- stimulation can be used to eliminate stuttering. 2. ----- method is widely used to train persons with neurogenic stuttering <p><u>True or false</u></p>

		<ol style="list-style-type: none"> 1. The treatment methods traditionally used in developmental stuttering cannot be used in case of Neurogenic Stuttering. 2. Training patients to relax muscles with the help of electromyographic biofeedback can be effective in reducing neurogenic stuttering. 3. DAF can't induce fluency in neurogenic stuttering cases.
34.	<p>Answers</p> <p>Text slide giving answers to the above questions</p>	<p><u>Fill in the blanks</u></p> <ol style="list-style-type: none"> 1. Thalamus 2. Pacing <p><u>True or false</u></p> <ol style="list-style-type: none"> 1. False 2. True 3. False
35.	<p>Conclusion</p> <p>Text slide with voice over</p>	<p>Depending on the nature of the insult/damage to the individuals neurological system and the duration of the dysfluencies there are exceptions in the speech and language characteristics of the person with neurogenic stuttering.</p> <p>The continuing research with these individuals suggest that there is likely to be individual variability associated with what may be too readily thought of as stereotypical behavioural characteristics of this population.</p>
36.	<p>Implication</p> <p>Text slide with voice over</p>	<p>I hope that this tutorial will enhance the clinical knowledge of the upcoming professionals with regard to assessment and management of neurogenic stuttering and will help speech-language pathologists to get a clearer understanding of neurogenic stuttering. This tutorial can therefore serve as a reference for speech-language pathologists to handle PWNS with more confidence.</p>
37.	<p>Acknowledgement</p>	<p>Thank you</p>

Appendix II

Master's Dissertation (Speech-Language Pathology) 2020-2021

CLINICAL TUTORIAL ON NEUROGENIC STUTTERING FOR SPEECH-LANGUAGE PATHOLOGISTS

Validation Questionnaire

Adapted from Feedback Rating Questionnaire in Field Testing of MANAT-K (Goswami, Shanbal, Navitha & Samasthitha, 2010)

Sl. No	Parameters	Very Poor	Poor	Fair	Good	Excellent
1	Simplicity (Is the tutorial comprehensible?)					
2	Size (Are the pictures, slides and subtitles of appropriate size?)					
3	Color and appearance (Are the videos in the tutorial appropriate in terms of color and dimension?)					
4	Presentation (Are the subtitles and slides placed in the video appropriately?)					
5	Volume (Is the volume in the tutorial adequate?)					
6	Relevance (Is the tutorial culturally and ethically acceptable?)					
7	Iconicity (Does the picture and video appeared to be recognizable and representational?)					

8	Accessibility (Is the tutorial user friendly?)					
9	Trainability (Can the tutorial be used for student training purpose?)					
10	Publication, outcomes and developers (Is there any other resource material similar to this video tutorial which you are aware of?)					
11	Questionnaire (Are the test items used in the questionnaire appropriate?)					
12	Coverage of parameters (Does the tutorial contain essential information on the fluency disorder?)					

Appendix III

Master's Dissertation (Speech-Language Pathology) 2020-2021 CLINICAL TUTORIAL ON NEUROGENIC STUTTERING FOR SPEECH-LANGUAGE PATHOLOGISTS

PRETEST POSTTEST QUESTIONNAIRE

PART 1

Name:

Age:

Gender:

Student: Yes/No

If yes, course and year:

Working: Yes/No

If yes, years of experience in the field

1. *Have you come across any persons with neurogenic stuttering (PWNS): Yes/No*
2. *Have you ever carried out assessment for a PWNS: Yes/No*
3. *Have you ever delivered treatment for a PWNS: Yes/No*

**highlighted options are the answers*

PART 2

1. Types of acquired stuttering are
 - (a) Cluttering and neurogenic stuttering
 - (b) Cluttering, neurogenic and psychogenic stuttering
 - (c) Neurogenic and psychogenic stuttering
 - (d) Cluttering and psychogenic stuttering**

2. Persons with neurogenic stuttering stutters on
 - (a) Function words
 - (b) Content words
 - (c) Function and content words**
 - (d) None of the above

3. Expansion of SAAND is
 - (a) Stuttering acquired with associated neurogenic disorders

- (b) Stuttering associated with acquired neurogenic disorders
 - (c) Stuttering associated with acquired neurological disorders**
 - (d) None of the above
4. In acquired stuttering
- (a) Dysfluencies occur in all word positions**
 - (b) Dysfluencies occur more on vowels
 - (c) Dysfluencies occur only in word initial positions
 - (d) Dysfluencies occur more on stressed syllables
5. More stuttering on ----- syllables in neurogenic stuttering
- (a) Initial
 - (b) Final
 - (c) Middle
 - (d) Non-initial**
6. Which of the following is NOT a known cause for neurogenic stuttering?
- (a) traumatic brain injury
 - (b) cerebrovascular accident
 - (c) Genetics**
 - (d) Drugs
7. Which of the following statement regarding neurogenic stuttering is wrong?
- (a) Secondary characteristics not common
 - (b) No pattern of stuttering location related to content/function words
 - (c) Adaptation may or may not occur**
 - (d) Less variable across situations
8. Which of the following features do researchers believe that distinguish neurogenic stuttering from developmental stuttering in adults?
- (a) only in neurogenic stuttering is the speaker annoyed but not anxious**
 - (b) only in neurogenic stuttering do repetitions, prolongations and blocks not occur solely on initial syllables of words and utterances
 - (c) only in developmental stuttering are secondary symptoms not associated with moments of dysfluency
 - (d) only in developmental stuttering do dysfluencies occur on grammatical words nearly as frequently as on substantive words
9. Which is not a characteristic of individual with neurogenic stuttering
- (a) No secondary symptoms
 - (b) No adaptation effect
 - (c) No previous history
 - (d) No annoyance**
10. Canter classified neurogenic stuttering into
- (a) Dysarthric, dysnomic and apraxic stuttering**

- (b) Developmental and acquired stuttering
 - (c) Dysphagic, aphasic and dyspraxic stuttering
 - (d) None of the above
11. Which among the following is not a characteristic of individual with dysarthric stuttering.
- (a) Articulatory freezing
 - (b) Effortful speech**
 - (c) Effortless speech
 - (d) Long silent blocks
12. Which of the following is an example of utterance of a person with neurogenic stuttering?
- (a) I-I recently-ly had a st-st-stroke**
 - (b) I've j.....j ust ex-ex-ex-experienced an e.....e motionally upset event
 - (c) Why-why uh does everyone...you know..uh..tell me...ask me....uh...to....repeat
 - (d) None of the above
13. If fluency inducing conditions do not ----- fluency, this suggest neurogenic stuttering.
- (a) Increase**
 - (b) Decrease
14. Self-assessment of attitudes in person with neurogenic stuttering can be assessed using
- (a) SAAND
 - (b) ABASA
 - (c) LCB**
 - (d) SSI
15. Emotional response to stuttering present in neurogenic stuttering.
- (a) Anxiety
 - (b) Annoyance**
 - (c) Fear
 - (d) Sad
16. Which of the following is most beneficial in persons with neurogenic stuttering.
- (a) Choral reading**
 - (b) Pacing
 - (c) Breathing exercises
 - (d) None of the above

17. Singing and chorus speaking can induce immediate fluency in developmental, but not in neurogenic stuttering.
(a) **True**
(b) False
18. Devices not used for neurogenic stuttering
(a) DAF
(b) Pacing board
(c) Metronome
(d) **None of the above**
19. “Stuttering modification tools such as preparatory set, cancellation and preparatory set cannot be used in individuals with neurogenic stuttering”.
(a) **True**
(b) False
20. ----- can be used to apply the technique of speaking one syllable at a time.
(a) **Pacing device**
(b) DAF
(c) Masking
(d) All of the above
21. Treatment approaches used in neurogenic stuttering are
(a) Pharmacological
(b) Surgical
(c) Behavioural
(d) **a, b and c**
22. Selection of treatment approaches and prognosis depends upon the following factors:
(a) Underlying neuropathology
(b) Fluency diagnosis
(c) Health conditions of the individual
(d) **All of the above**
23. A 40 year old male reported to a clinic with the complaint of reduced clarity of speech, speech unintelligible to strangers, slurring of speech and dysfluent speech post RTA. CT scan reveal chronic lacunar infarcts. From the case history can you guess the most suitable provisional diagnosis.
(a) **Dysarthria with neurogenic stuttering**
(b) Apraxia with neurogenic stuttering
(c) Aphasia with neurogenic stuttering
(d) Dysarthria with apraxia

24. A 48 year old female reported to the OPD with the complaint of slurring of speech, dysfluent speech post CVA. Facial weakness and ear pain present. Client is under medication for depression since 1 month. Recommendation made by you will include?

1. Neurological evaluation
2. Gynecological evaluation
3. Psychological evaluation
4. ENT evaluation
5. Gastroenterological evaluation
6. Speech and language evaluation

(a) 1,4,5,6,

(b) 1,2,3,6

(c) 1,3,4,6

(d) 1,2,4,6

25. A 58 year old male reported to the clinic for re-evaluation, previously he was diagnosed with Brocas aphasia. During the evaluation examiner observed dysfluencies in his speech. After the re-evaluation provisional diagnosis made was conduction aphasia with acquired speech fluency disorder. What among the following is true.

(a) Acquired stuttering doesn't co-occur with conduction aphasia

(b) The diagnosis should be Brocas aphasia with neurogenic stuttering

(c) Neurogenic stuttering co-occurs with aphasia, dysarthria and apraxia

(d) The diagnosis can't change from time to time

Appendix IV

Master's Dissertation (Speech-Language Pathology) 2020-2021 CLINICAL TUTORIAL ON NEUROGENIC STUTTERING FOR SPEECH-LANGUAGE PATHOLOGISTS

PRETEST POSTTEST QUESTIONNAIRE – Google Form

CLINICAL TUTORIAL ON NEUROGENIC STUTTERING FOR SPEECH-LANGUAGE PATHOLOGISTS- Master's dissertation...
PRE-TEST QUESTIONNAIRE This survey include 25 pretest questions.
docs.google.com

Greetings! Professionals

I Shinsi Binth E K is currently pursuing my Masters in Speech Language Pathology in All India institute of speech and hearing. I am doing my dissertation on "Clinical tutorial on neurogenic stuttering for Speech language Pathology students" under the guidance of Dr Sangeetha Mahesh. This questionnaire can be taken up by **Students of Speech-Language Pathology and Speech Language Pathologists with minimum 1 year experience in Fluency disorders** after the completion of Masters or Bachelors program. It will take 15-20 mins to complete this online pre-test questionnaire . Professionals are requested to fill pre questionnaire, followed by 49 minutes video and post-test questionnaire.

The data retrieved from the survey will be used only for the purpose of research and will remain confidential. Thank you for spending your time to fill out the questionnaire and contributing for research.

To fill out the above mentioned questionnaire please click on the link provided
Pre test:
https://docs.google.com/forms/d/e/1FAIpQLSc3kCUjhGhSUIEkdDHRQTfPCg9JUkXumXUZ5Wnixl7KI7kgQ/viewform?usp=sf_link

Video tutorial
<https://drive.google.com/file/d/1hpnzvSt1pBxTwUM38PhTTlftvcyglzC/view?usp=sharing>

Post-test:
https://docs.google.com/forms/d/e/1FAIpQLSdpCgkGCNt1gP2L83ZRSOSkGJ9_2gKu4AuGeqWIRiZJXuzLWQ/viewform?usp=sf_link

Regards
Shinsi Binth E K
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1:54 pm ✓

CLINICAL TUTORIAL ON NEUROGENIC STUTTERING FOR SPEECH-LANGUAGE PATHOLOGISTS- Master's dissertation (Speech-Language Pathology) 2020-2021

PRE-TEST QUESTIONNAIRE

This survey include 25 pretest questions. kindly go through the questions and try to answer them.



[Redacted]

n (not shared) [Switch account](#)



* Required

Email *

Your answer

Name *

Your answer

Instructions

Please read the questions carefully and select the options according to your perception and experience in the field of fluency disorders

1. Types of acquired stuttering are

1 point

- (a) Cluttering and neurogenic stuttering
- (b) Cluttering, neurogenic and psychogenic stuttering
- (c) Neurogenic and psychogenic stuttering
- (d) Cluttering and psychogenic stuttering

2. Persons with neurogenic stuttering stutters on

1 point

- (a) Function words
- (b) Content words
- (c) Function and content words
- (d) None of the above

CLINICAL TUTORIAL ON NEUROGENIC STUTTERING FOR SPEECH-LANGUAGE PATHOLOGISTS - Master's dissertation (Speech-Language Pathology) 2020-2021

POST-TEST QUESTIONNAIRE

This survey include 25 pretest questions. kindly go through the questions and try to answer them.

 : m (not shared) [Switch account](#) 

* Required

Name *

Your answer

Email *

Instructions

Please read the questions carefully and select the options according to your perception and experience in the field of fluency disorders

1. Types of acquired stuttering are

1 point

- (d) Cluttering and psychogenic stuttering
- (b) Cluttering, neurogenic and psychogenic stuttering
- (a) Cluttering and neurogenic stuttering
- (c) Neurogenic and psychogenic stuttering

- 5. Gastroenterological evaluation
- 6. Speech and language evaluation

25. A 58 year old male reported to the clinic for re-evaluation, previously he was diagnosed with Brocas aphasia. During the evaluation examiner observed dysfluencies in his speech. After the re-evaluation provisional diagnosis made was conduction aphasia with acquired speech fluency disorder. What among the following is true. 1 point

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- (b) The diagnosis should be Brocas aphasia with neurogenic stuttering
- (c) Neurogenic stuttering co-occurs with aphasia, dysarthria and apraxia
- (d) The diagnosis can't change from time to time

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