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(RESEARCH ARTICLE)

Person centered stroke rehabilitation in a low-resource country: A three-track reasoning case on dysphagia and cognitive recovery

Zannatul Ferdous Farin [1,*], Kamrunnaher Koly [2], Tahmina Sultana [3] and Md. Obaidul Haque [4]

[1] *Department of Speech and Language Therapy, Centre for the Rehabilitation of the Paralysed (CRP), Bangladesh.*
[2] *Department of Rehabilitation Science; Bangladesh Health Professions Institute (BHPI); CRP, Bangladesh.*
[3] *Department of Speech and Language Therapy, Centre for the Rehabilitation of the Paralysed (CRP), Bangladesh.*
[4] *Department of Physiotherapy, Bangladesh Health Professions Institute (BHPI), CRP, Bangladesh.*

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Abstract

Stroke remains one of the most common causes of long-term disability, and, in particular, the complications of oropharyngeal dysphagia and cognitive deficits pose unique challenges of dysphagia, disability, and communication. This case study describes the clinical reasoning of a speech and language therapist with a 40-year-old Bangladeshi woman who had oropharyngeal dysphagia and cognitive impairment due to left-hemispheric ischemic stroke. This study aims to apply structured three-track clinical reasoning to assess and manage post-stroke oropharyngeal dysphagia and cognitive impairment in a low-resource setting, focusing on accurate evaluation, patient-centered interventions, and functional recovery. After acute care she was referred to the Centre for the Rehabilitation of the Paralysed (CRP)-Mirpur for rehabilitation. The case study did not have access to instrumental diagnostic and therapeutic facilities which necessitated instrumental clinical reasoning and structural reasoning frameworks. A speech and language therapist applied three track reasoning comprised of procedural, interactive, and conditional reasoning for evaluation and intervention planning. Therapist did oral motor assessment, food screening and cognitive screening through informal screening. Interactive reasoning was used enable and encourages participation. Conditional reasoning facilitated addressing broader sociocultural and functional contextual dimensions. The therapy was matched to the situational requirements. Food texture adjustment and compensatory techniques were part of swallowing rehabilitation; cognitive activities were included into relevant tasks such meal planning and sequence of home chores. Over 6 weeks, the patient went from complete reliance to partially supervised intake of changed diets and enhanced functional memory and attentiveness. These successes let her start some home chores once again, hence enhancing her self-esteem and family assimilation.

Keywords: Stroke; Oropharyngeal dysphagia; Cognitive impairment; Clinical reasoning; Three-track reasoning; Low-resource setting and Patient-centered care.

1. Introduction

Stroke refers to an acute interruption of blood supply to the brain, causing a constellation of neurological deficits based on the region involved. Around fourteen percent of the strokes are due to Ischemia which is the lack of blood supply, constituting approximately 87 percent of all stroke cases around the globe [1]. In Bangladesh, the occurrence of stroke has increased dramatically because of non-communicable risk factors. Women are particularly vulnerable because of lack of timely access to medical care and rehabilitation [2]. World Stroke Organization mentioned that stroke impacts nearly 13.7 million individuals each year, out of which a huge number of patients suffer from chronic neurological deficits [3]. Some of the more prominent ones that have severe consequences on the autonomy and wellbeing of the

* Corresponding author: Zannatul Ferdous Farin

affected patients [4] are oropharyngeal dysphagia and cognitive dysfunction which tend to be neglected. The condition is very alarming, especially for caretakers of the family, like South Asian housewives, who have vital societal and economic responsibilities.

In the case of stroke survivors, oropharyngeal dysphagia is characterized by the inability to initiate a swallow and propel the bolus into the esophagus [5]. Disruption in the coordination of the muscles that are responsible for swallowing usually leads to this condition, which can arise from a collection of various uncommon system injuries, and stroke is one of the more frequent causes [6]. These patients face additional challenges, such as the risk of aspiration, cough for clear voice, wet voice, prolonged period of eating, drooling, leftover food residue in the mouth, malnutrition, dehydration as well as impairment of psychosocial dimension, which dramatically impact their overall healthcare undertaking [7]. Cognitive deficits associated with a stroke may affect attention, memory, executive functioning, and/or language processing, which impede a patient's ability to follow directions, participate in therapeutic activities, and conduct daily functions and chores. Cop-existing dysphagia with cognitive impairments makes rehabilitation more challenging and requires a tailored multidisciplinary approach to the management of the patient [8].

Videofluoroscopic Swallowing Study (VFSS) is considered the gold standard for assessing dysphagia; however, it is not often available in rural or under-resourced areas [9]. Therefore, clinicians are reliant on bedside swallowing assessments, which require watching how patients manage different food textures alongside active signs like coughing, changes in voice, or lethargy during the intake of food [5]. Furthermore, the Gugging Swallowing Screen (GUSS) and Water Swallow Test (WST) are used to estimate the level of disability in dysphagic patients in non-clinical settings [10].

Post-stroke cognitive impairment manifests in a person's memory, executive functioning, language, and attention capabilities. These cognitive problems can influence a patient's compliance with an instruction, engagement in therapy, and management of the activities of daily living [8]. Assessing cognitive impairment detects employing assessing instruments such as The Montreal Cognitive Assessment (MoCA) and the Mini-Mental State Examination (MMSE), which are frequently used. In this case, a basic verbal cognitive assessment was given at the appropriate reading level with basic command, recall, and problem-solving tasks. The therapist also used other forms of context by gathering through other family members, through observation [7].

Clinical reasoning involves different components or types, including procedural, interactive, conditional, narrative, and scientific (or hypothetico-deductive) reasoning [11]. Reasoning procedures are the use of scientific and technical knowledge to solve a patient's physical problem, like choosing appropriate techniques for dysphagia swallowing. On the other hand, interactive reasoning involves building therapeutic relationships with patients by attending to their psychosocial needs so that they can participate meaningfully in the care they receive. Conditional reasoning incorporates the patient's broader context like family, culture, and even long-term goals which is very relevant when the patient is a primary caregiver or has community responsibilities [12]. Narrative reasoning helps the clinician make sense of the patient's particulars, while scientific reasoning involves making hypotheses and proving them through observations and collecting relevant evidence. In professional practice, clinical reasoning integrates the knowledge from learning activities with real-world experience. Encouraging independence, critical thinking, and effective patient-centered care are vital for rehabilitation professionals like speech-language therapists [13].

The aim of this study was to apply structured clinical reasoning, including three-track reasoning, to assess and manage a post-stroke patient with oropharyngeal dysphagia and cognitive impairment in a low-resource setting.. The objectives were:

- To explore the use of clinical reasoning in assessing the patient's swallowing difficulty and cognitive challenges following stroke.
- To utilize three-track reasoning (procedural, interactive, and conditional) for diagnosis and treatment planning.
- To implement patient-centered, evidence-based interventions without access to instrumental diagnostics.
- To assess patient outcomes and reflect on the clinical reasoning strategies used throughout the intervention process.

Best practices in post-stroke rehabilitation emphasize the need to take a holistic approach to address communication and cognitive functions [14]. An integrated understanding of clinical reasoning is vital when working with complex post-stroke oropharyngeal dysphagia and cognitive impairment. This will lead to correct diagnosis and intervention, which will result in a better response to a patient's needs while allowing one to shift from a collection of recovery to a holistic approach for safer care of the patient.

2. Materials and methods

2.1. Study Design and Setting

This study was a single-patient case report and took place at the Stroke Rehabilitation Unit within the Centre for the Rehabilitation of the Paralysed (CRP) in Mirpur, Dhaka, Bangladesh. The duration of the case study was six weeks, during which the patient was provided 4-5 session weeks of intensive therapy.

2.2. Participant

The subject was a 40 year old female Bangladeshi housewife who presented with left-hemispheric ischemic stroke, oropharyngeal dysphagia, and cognitive impairment. She had no history of cognitive impairment or dysphagia prior to the stroke. After five days of hospitalization, she was discharged with ongoing swallowing and memory issues. Limited access to advanced diagnostics and financial constraints hindered care, while emotional distress and family unawareness added to her challenges.

2.3. Assessment Tools and Materials

Due to the limited resources of the setting, there were no instrumental diagnostic procedures to use. There was no Videofluoroscopic Swallowing Study (VFSS) or Fiberoptic Endoscopic Evaluation of Swallowing (FEES) available. Instead, food trials and clinical bedside assessments were used. These included:

2.3.1. Bedside Swallowing Assessment

Observation while swallowing various food textures, noting signs of coughing, choking, wet voice, or delayed swallowing.

2.3.2. Oral-Motor Examination

Inspection of tongue strength, jaw closure, and control while orally bolus.

2.3.3. Gugging Swallowing Screen (GUSS)

A developed instructional bedside screening tool for dysphagia.

2.3.4. Informal Cognitive Screening

Contextual tasks for commands, recall and simple problems were presented to the patient, and appropriate tasks were designed for the patient's literacy level.

2.3.5. Family and Caregiver Report

Further information about patient's daily functioning and progress.

2.4. Intervention Procedures

The three-track clinical reasoning therapy (procedural, interactive, conditional) approach guided this therapy. The study lasted six weeks, during which the patient engaged in intensive therapy 4-5 times a week, covering the following:

2.4.1. Swallowing Interventions

Chin tuck, Masako Maneuver, safe swallowing strategies including positioning, environmental modification, slow feeding rate and bolus modification strategies were applied. Locally available thickening agents such as */isubguler bhushi/* (Psyllium husk) and */sagudana/* (tapioca pearls) were used to modify liquid consistency. Soft Bangladeshi foods (e.g., */khichuri/* (rice cooked with lentils), mashed pumpkin) were adapted for safe swallowing.

2.4.2. Cognitive Interventions

Tasks embedded in daily household activities such as sequencing steps of a recipe and identifying utensils were designed. To facilitate performance, simplified and repeated tasks using visual aids and worked with the caregivers were considered.

2.4.3. Interactive Approaches

Rapport was built through patient-led meal preferences, motivational interviewing, and caregiver training with simple language and demonstrations.

2.5. Reasoning of Selecting Clinical Reasoning Method

The selected clinical reasoning method for a 40-year-old Bangladeshi female stroke with cognitive impairment and oropharyngeal dysphagia was the **three-track reasoning** that includes procedural, interactive and conditional reasoning. This case's contextual factors such as the lack of diagnostic tools like videofluoroscopic swallowing study (VFSS) shaped the reasoning approach. It was Selected because not only was the reasoning case complex, but it also had contextual restraints bounded by lack of resources.

Within the framework of the three track reasoning, procedural reasoning was required to guide the structured evaluation of swallowing and cognition. This reasoning guided the therapist to construct and interpret clinical data by performing bedside assessments, food trials, and informal cognitive screenings. In limited resource settings, bedside evaluations are often the only means used to detect physiological deficits in a patient's swallowing and mental status [15], so they are integral to inclusion. During intervention, procedural reasoning was the guiding rationale for the smoothing strategies of swallowing (Chin tuck, Masako maneuver, safe swallowing strategies including positioning, environmental modification, and slow feeding rate) and, food texture modifications, and graded cognitive tasks to tailor the patient's ability. This reasoning also justified the choice of therapeutic techniques that were made after clinical observations. Regular monitoring facilitated timely adjustments to interventions to ensure they remained safe and effective.

A therapeutic alliance was difficult to engage the patient with due to cognitive impairment, emotional fragility, and low motivation, but the **interactive approach** helped them to do so. Establishing rapport and appreciating the values and needs of the patient, particularly in her capacity as the caregiver and the family cook, was important. **Interactive reasoning** is defined as a focusing aspect of care that is more humanistic, involving communication and empathy, which are necessary during the care of people who are recovering post-stroke and have functional and psychological system disruptions [16].

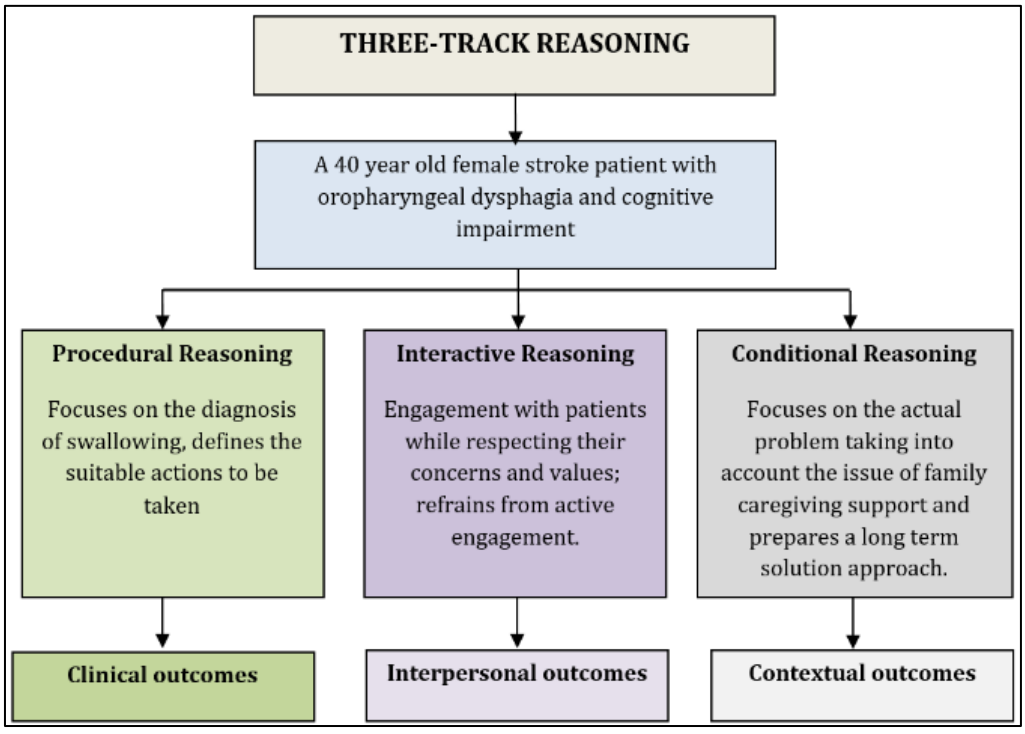

Figure 1 Flow chart of selecting clinical reasoning method

Conditional reasoning helped in understanding the patient's concerns by integrating them with her family roles, socio-economic status, and expectations for recovery over time. It facilitated the therapist's consideration of family dependencies, emotional health, and reintegration into the home to look beyond immediate impairments. As a whole, these factors combine with the principles of patient-centered care, which focus on patients' needs in planning, achieving, and setting long-term goals [17]. These three reasoning tracks adopted an integrated approach to problem solving that was versatile and complete. It helped flexible clinical judgment in the face of sociocultural uncertainty and individual differences within a confined framework.

2.6. Outcome Measures

Progress was tracked through weekly reassessment of swallowing safety, oral intake tolerance, communication ability, and cognitive task performance. Functional outcomes were documented in terms of patient independence in feeding, psychosocial engagement, and overall quality of life.

3. Analysis and Discussion

This case study investigates the care of a 40-year-old Bangladeshi housewife depending on her family who presented oropharyngeal dysphagia and cognitive impairment after a left-hemispheric ischemic stroke. She got six weeks of intensive therapy under the Centre for the Rehabilitation of the Paralysed (CRP) at the stroke rehabilitation center at CRP-Mirpur. Three track clinical reasoning including procedural, interactive, and conditional were to direct clinical decision-making in a resource-limited environment.

Procedural reasoning oriented the assessment process and initial intervention design. Left-sided hemiparesis, poor oral motor strength, coughing throughout oral intake, and poor bolus clearance; all suggested oropharyngeal dysphagia. Due to budgetary and logistical constraints, no instrumental diagnostic equipment such VFSS or FEES called for clinical triangulation relying on converging symptoms, patient history, and dynamic food trial observations [18]. Reduced laryngeal elevation, slow swallow onset, and frequent coughing with thin liquids were discovered using bedside swallowing assessment, including oral-motor testing, the Gugging Swallowing Screen (GUSS), and graded food trials.

During the cognitive screening, there were deficits observed in orientation, working memory, and attention. Differentiating cognitive impairment from post-stroke aphasia, however, was a clinical challenge since both conditions could exhibit comprehension, diminished verbal output, and multi-step command execution deficits. Due to the overlapping symptoms, distinguishing global from cognitive impairment was crucial. For example, a patient with global aphasia would normally display profound comprehension and expression deficits, frequently unable to obey commands and produce any meaningful speech [19]. This distinction was not made in early evaluations where the patient was not responding at all. Later her obeyed commands and answering without speech but not verbally, ruling out global aphasia. The other was dynamic assessment, the therapist outlines nonverbal problem-solving methods, gestures, and task persistence which go beyond mere cognitive processing to determine whether the limitations are linguistic. Thus, procedural reasoning was context-sensitive and guided by hypothesis formation with regard to interpreting the expressive inadequacy as purely cognitive.

Food modifications at the therapeutic center given the ambitious risk with thin liquids, textures were purposefully altered alongside swallowing maneuver interventions (chin tuck, masako) and safe swallowing strategies including positioning, environmental modification and slow feeding rate. Local sources of thickening agents—notably Psyllium husk (/isubguler bhushi/) and tapioca pearls (/sagudana/) were employed to change consistency to nectar and honey thickness levels. These affordable, culturally well-known goods guaranteed that therapies were long-lasting apart from a clinical setting. Similarly, conventional Bangladeshi meals such soft rice-lentil mix (/khichuri/) and mashed vegetables like pumpkins were prepared in smooth or pureed forms to satisfy cultural acceptance as well as dietary needs. Thus patient-centered, evidence-based interventions were implemented implement without access to instrumental diagnostics.

Aligned treatment with the patient's lived surroundings and socioeconomic constraints required conditional reasoning [20]. Treatment choices were considered through the prism of what was truly sustainable. Embedded cognitive activities like noting cooking tools or sequence food preparation steps change commonplace tasks into therapy opportunities by daily activities. By focusing on both dysphagia and cognition, this approach avoided the demand for formal neuropsychological tools.

Interactive reasoning is necessary to develop knowledge and trust. The therapist had to use visual aids, frequent demonstrations, and basic verbal signals because the caregiver (her husband) had low reading level. Motivational

interviewing techniques exposed emotional problems related to choking fears, food refusal, and patient passivity. Therapy included emotionally supportive approaches and patient-led decisions on meal preferences and pacing in reaction to these problems.

The therapist frequently used metacognitive reflection to adapt goals, session styles, and techniques. Therapy, for instance, was included in meals and condensed to accommodate weariness, hence raising compliance and reducing drop-off risk. Employing procedural reasoning with food trials and bedside testing, the therapist overcame numerous challenges and compensated for a lack of diagnostic equipment. Interactive thinking promoted self-assurance and offered emotional support thereby aiding in the management of choking anxiety and emotional resistance. Caregiver limitations were resolved using interactive thinking with simple directions and visual aids. Customizing treatment to daily household chores via conditional reasoning enabled the patient to control their complex house role.

After six weeks of therapy (4–5 sessions per week) the assessments were done again and the patient showed remarkable recovery. From total dependency she switched to controlled feeding of thickened liquids and soft solids. Her verbal involvement and attention span grew, albeit cognitive impairments continued slightly. Crucially, functional improvements pointed to the integrated approach's advantages for swallowing and both cognitive and linguistic domains.

In conclusion, this case emphasizes how well context sensitive, reasoning driven recovery works. Procedural reasoning enabled diagnostic accuracy and treatment planning; interactive reasoning fostered participation and flexibility; and conditional reasoning ensured that treatment remained pertinent and meaningful within the patient's socio-cultural context. One may successfully negotiate overlapping cognitive-linguistic symptoms, carry out culturally appropriate dietary changes, and maintain therapeutic momentum without complex technology only via a fluid, responsive three-track reasoning procedure adapted to a low-resource context.

Table 1 Summary of Outcomes

Domain	Initial Status (Week 0)	Post-Intervention (Week 6)
Swallowing ability	Severe dysphagia, coughing with thin liquids, poor bolus clearance	Safe intake of thickened liquids and soft solids
Cognition	Impaired orientation, attention, and memory; difficulty following multi-step commands	Improved orientation and attention; able to follow simple commands with support
Communication	Minimal verbal participation, hesitant responses	Increased verbal participation, basic conversational ability restored
Independence in feeding	Fully dependent on caregiver	Partially independent, controlled self-feeding
Psychosocial wellbeing	Anxiety, fear of choking, withdrawal from family meals	Reduced anxiety, re-engaged in family mealtimes

Abbreviation

- CRP- Centre for the Rehabilitation of the Paralysed
- FEES- Fiberoptic Endoscopic Evaluation of Swallowing
- GUSS- Gugging Swallowing Screen
- MMSE- Mini-Mental State Examination
- MoCA- Montreal Cognitive Assessment
- VFSS- Videofluoroscopic Swallowing Study
- WST- Water Swallow Test

4. Conclusion

This case study illustrates how even the absence of advanced technology does not inhibit one from achieving optimal outcomes with rehabilitation when employing advanced structured clinical reasoning. The subject of this study was a

40-year-old Bangladeshi female stroke survivor with oropharyngeal dysphagia and accompanying cognitive deficits. She required multidimensional responsive therapy addressing her culture specific needs. The use of three-track reasoning procedural, interactive, and conditional allowed appreciating fully the patient's physiological struggles, emotional realities, and social roles. Through bedside assessments and food trials, gathering information and formulating a working diagnosis was made possible through procedural reasoning. Emotional rapport was vital in enhancing patient's participation through interactive reasoning. Conditional reasoning gave attention to the bigger picture and permitted therapy to intersect with patient's aspirations, much important considering her role as a wife and mother. In integrating therapy with the patient's life goals, adherence to the therapy was much easier, as well as overcoming motivation issues in the long term. She most fundamentally returned to her parts as caregiver and homemaker, therefore finding guidance and fostering family ties. These developments emphasize the need of providing culturally sensitive, patient-centered care as it speeds functional recovery.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest. This was a self-funded study.

Statement of informed consent

Written informed consent was obtained from the patient and her primary caregiver for participation and for the use of anonymized clinical data in publication.

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