STUDY PROTOCOL

OFFICIAL TITLE

EFEKTIVITAS TERAPI LATIHAN MENELAN TERSTRUKTUR PADA PASIEN DENGAN KARSINOMA NASOFARING: KAJIAN TERHADAP FUNGSI MENELAN DAN KUALITAS HIDUP

English title: *The Effectiveness of Structured Swallowing Exercise Therapy in Patients with Nasopharyngeal Carcinoma: An Assessment of Swallowing Function and Quality of Life*

NCT Number: not yet assigned

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Research Methodology

RESEARCH METHODOLOGY

1.1 Research Design

This study will employ a randomized controlled trial (RCT) design. It is an interventional analytical study in which the interventions consist of conventional swallowing exercises and structured swallowing exercises.

1.2 Study Setting and Period

1.2.1 Study Setting

The study will be conducted at the Integrated Radiation Oncology Service, the Integrated Outpatient Clinic for Ear, Nose, and Throat–Head and Neck Surgery (ENT–HNS), the Radiology and Nuclear Medicine Service, and the Integrated Outpatient Medical Rehabilitation Clinic at Dr. Cipto Mangunkusumo National Central General Hospital.

1.2.2 Study Timeline

1. Preparation: June 2025–July 2026
2. Implementation: August 2026–January 2027
3. Analysis: February–March 2027
4. Presentation: April 2027

1.3 Study Population and Sample

1.3.1 Target Population

The population target of this study is patients with Nasopharynx carcinoma (NPC) in Indonesia.

1.3.2 Accessible Population

The accessible population comprises patients with NPC receiving outpatient care at the Integrated Radiation Oncology Service, the Integrated Outpatient Clinic for Ear, Nose, and Throat–Head and Neck Surgery (ENT–HNS), the Radiology and Nuclear Medicine Service, and the Integrated Outpatient Medical Rehabilitation Clinic at Dr. Cipto Mangunkusumo National Central General Hospital.

1.4 Inclusion and Exclusion Criteria

1.4.1 Inclusion Criteria

1. Male or female participants aged 18 to under 60 years.
2. Patients with NPC who have a satisfactory Mini-Mental State Examination (MMSE) score (25–30).
3. Hemodynamically stable.
4. Patients with non-metastatic NPC, a Gugging Swallowing Score (GUSS) of 0 – 20, and a Penetration Aspiration Scale (PAS) score of ≥ 1.
5. Patients whose Video Fluoroscopic Swallow Study (VFSS) results are compatible with International Dysphagia Diet Standardization Initiative (IDDSI) levels 0 (thin liquid consistency) and 3 (moderately thick liquid / pureed food consistency), with or without a nasogastric tube (NGT).
6. Provision of written informed consent to participate in the study.

1.4.2 Exclusion Criteria

Participants with a history of other conditions affecting swallowing function, such as stroke, Parkinson's disease, myasthenia gravis, head and neck cancer other than nasopharyngeal carcinoma, esophageal cancer, or traumatic brain injury.

1.5 Sample Size

1.5.1 Sample Size Calculation Based on Hyolaryngeal Excursion

The sample size for this study was calculated based on the primary outcome of change in hyolaryngeal excursion, which is quantitatively assessed using VFSS. Accordingly, the sample size was determined using the formula for testing the difference between the means of two independent groups. The sample size formula used is presented below, with the following parameter values:

1. n= sample size per group
2. Zα/2: Z value for a two-sided α (e.g., 1.96 for α = 0.05)
3. Zβ = Z value corresponding to 80% power

4. σ^2: pooled variance
5. $\mu_1 - \mu_2$ = expected difference between means (intervention effect)

The standard deviation (σ) was set at 4 mm based on a synthesis of previous studies investigating the measurement of hyolaryngeal excursion using VFSS and ultrasonography. Previous studies have reported standard deviations for hyolaryngeal excursion ranging from 2.7 to 4 mm, depending on population characteristics, measurement methods, bolus types, and dysphagia status. Lee et al. reported standard deviations of 2.7–2.8 mm in patients with dysphagia and varying degrees of aspiration, whereas other studies have indicated that variability in hyolaryngeal excursion measurements is influenced by participant heterogeneity and measurement errors, which may reach 2.5–3 mm.[154,155]

Considering that this study involves patients with nasopharyngeal carcinoma, who are expected to exhibit greater variability in swallowing biomechanics than healthy individuals, a more conservative standard deviation of 4 mm was adopted to avoid underestimating the required sample size and to maintain adequate statistical power. Based on these considerations, the values used for the sample size calculation are as follows:

$$n = \frac{2(Z_{\alpha/2} + Z_{\beta})^2 \sigma^2}{(\mu_1 - \mu_2)^2}$$

$$n = \frac{2(1{,}96 + 0{,}84)^2 (4)^2}{(2{,}5)^2}$$

Based on the formula above, the required sample size was calculated to be 40 participants per group. After accounting for a potential 10% dropout rate, the minimum required sample size was increased to 44 participants per group.[23,156,157]

1.5.2 Sample Size Calculation Based on the PAS

The second primary outcome of this study is the change in swallowing function, assessed using the Penetration–Aspiration Scale (PAS). The PAS is a widely validated ordinal instrument used to assess the severity of penetration and aspiration based on VFSS or fiberoptic endoscopic evaluation of swallowing (FEES). It is also widely used as a primary outcome measure in dysphagia rehabilitation intervention studies involving patients with head and neck cancer, particularly nasopharyngeal carcinoma.[158, 159]

The sample size calculation was based on the randomized controlled trials (RCTs) conducted by Petersson et al. (2025) and Dotevall et al. (2023), which evaluated the effectiveness of swallowing exercises in patients with head and neck cancer. Both studies considered a one-point change in the PAS score to represent the minimum clinically meaningful difference. Petersson et al. used a standard deviation of 1.3, whereas Dotevall et al. used a standard deviation of 1.2 for their sample size calculations, with a significance level (α) of 5% and a statistical power of 80%.[159, 160]

$$n = \frac{2(1{,}96 \; + \; 0{,}84)^2(1{,}3)^2}{(1)^2}$$

$$n = \frac{2(Z_{\alpha/2} + Z_{\beta})^2\sigma^2}{(\mu_1 - \mu_2)^2}$$

Given the similar population characteristics, a more conservative assumption was used: a standard deviation of 1.3 and a target minimum between-group mean difference of one PAS point, with α = 5% and 80% power. This yielded a minimum of 27 participants per group. After allowing for a potential 10% dropout rate, the minimum sample size increased to 29 participants per group.

1.5.3 Sample Size Calculation Based on the EORTC QLQ-H&N35

The third primary outcome of this study is the change in quality of life, assessed using the EORTC QLQ-H&N35. This instrument is a questionnaire specifically designed for patients with head and neck cancer to evaluate various aspects of disease- and treatment-related quality of life, including swallowing function, eating problems, social contact, dry mouth, and other symptoms commonly experienced by patients following radiotherapy. Each domain score is transformed to a scale ranging from 0 to 100, allowing the scores to be treated as numerical data for parametric analysis when the data are normally distributed. Furthermore, the EORTC QLQ-H&N35 has been validated and demonstrated to be reliable for use in the Indonesian population.[161]

The sample size was calculated using the formula for hypothesis testing of the difference between two independent means. The Swallowing domain was used as the basis for the calculation because it most closely aligns with the study objective, namely, to evaluate the effectiveness of swallowing exercise therapy in improving swallowing function and quality of life in patients with nasopharyngeal carcinoma. The mean and standard deviation values were obtained from the RCT conducted by Petersson et al., which evaluated swallowing exercises in patients with head and neck cancer following radiotherapy and used the EORTC QLQ-H&N35 as one of its study outcomes.[162]

$$n = \frac{2(1{,}96 + 0{,}84)^2(23)^2}{(7{,}6)^2}$$

$$n = \frac{2(Z_{\alpha/2} + Z_{\beta})^2\sigma^2}{(\mu_1 - \mu_2)^2}$$

Based on these calculations, the required sample size was found to be larger for the EORTC QLQ-H&N35, at 145 patients, compared with the

calculations based on swallowing biomechanical parameters (PAS and HLE). This is attributable to the high variability in EORTC QLQ-H&N35 scores, as it is a patient-reported outcome measure, resulting in relatively large between-individual standard deviations. Similar findings have been observed in various RCTs of dysphagia rehabilitation in patients with head and neck cancer. In these studies, sample size calculations are generally based on objective outcomes, such as PAS, mouth opening, or biomechanical swallowing parameters such as HLE, whereas the EORTC QLQ-H&N35 is used as a secondary outcome to evaluate the clinical benefits perceived by patients.[159, 162]

In this study, sample size calculations were performed for three primary outcomes: PAS, hyolaryngeal excursion, and quality of life assessed using the EORTC QLQ-H&N35. Each parameter was calculated using data from previous studies. Although the sample size calculation based on the EORTC QLQ-H&N35 yielded a larger required sample, this instrument is a patient-reported outcome measure with substantial interindividual variability. In contrast, objective outcomes such as hyolaryngeal excursion and PAS more directly reflect the biomechanical changes in swallowing targeted by the swallowing exercise intervention and are commonly used as the basis for power calculations in most RCTs of dysphagia rehabilitation in patients with head and neck cancer.[159, 162]

Therefore, the minimum sample size for this study was determined by the largest calculation among the objective swallowing-function parameters: 44 participants per group. Allowing for a potential 10% dropout rate, the minimum total recruitment target is 88 participants, comprising 44 participants in each group.

1.6 Research Instruments and Materials

1. Informed consent form.
2. Research status form.

3. *Swallowing exercise leaflet.*
4. Swallowing exercise video.
5. *Video Fluoroscopic Swallowing Study* (VFSS) merk *Siemens Healthcare* series *Luminos Agile*®.
6. Result paper for VFSS including PAS and Hyolaryngeal Excursion results.
7. EORTC QLQ-H&N35 bahasa Indonesia version.
8. *Food Thickener* merk *Nestle*.
9. Bottled drinking water.
10. Plastic cups and spoons.
11. Food and liquid consistencies standardized to IDDSI levels 0 and 3.
12. A 12-cm-diameter rubber ball (pressure: 1.5 psi = 77.5 mmHg).

1.7 Operational Definitions

No.	Variable	Operational Definition	Measurement Tool / Data Source	Measurement Procedure	Measurement Result	Data Type
1	Age	Time elapsed from the participant's date of birth to study recruitment, expressed in years.	Medical record / identification card	Recorded from the date of birth or age documented in the medical record.	Years; participants aged 18 to <60 years	Numerical
2	Sex	Participant's biological sex.	Medical record	Recorded from the medical record.	1 = male; 2 = female	Categorical
3	Body mass index	Anthropometric status calculated as body weight divided by height squared.	Scale, stadiometer, calculator	Weight (kg) / height (m^2)	kg/m^2; may be categorized according to Asia-Pacific/WHO Asian criteria	Numerical
4	MMSE	Cognitive screening score used to ensure that the participant can understand the exercise instructions.	MMSE questionnaire	Structured interview and administration of the test.	Score 0–30; eligible if 25–30	Numerical
5	Nasopharyngeal carcinoma	A malignancy arising from the nasopharyngeal epithelium, diagnosed through history-taking, physical examination, and histopathological examination.	Medical record	Diagnosis confirmed from the medical record.	Yes/no; only 'yes' qualifies for study inclusion	Categorical

No.	Variable	Operational Definition	Measurement Tool / Data Source	Measurement Procedure	Measurement Result	Data Type
6	GUSS	Bedside screening tool used to assess dysphagia severity and aspiration risk through a stepwise swallowing assessment.	Gugging Swallowing Screen	Initial/indirect and direct swallowing tests, followed by semisolid, liquid, and solid trials if the preceding stage is safe.	Score 0–20	Numerical
7	Dysphagia	Disorder of oral and/or pharyngeal or esophageal swallowing, indicated by symptoms or clinical signs of swallowing impairment, abnormal screening and/or abnormal objective findings on VFSS according to the study criteria.	Structured history, clinical swallowing examination, GUSS, and VFSS	Assess symptoms and clinical signs, including difficulty swallowing, choking, coughing during/after eating or drinking, wet voice after swallowing, sensation of food sticking, prolonged mealtimes, or reduced oral intake. Screen using GUSS. Dysphagia is established on VFSS if one or more findings are present: impaired oral bolus transport, delayed swallow initiation, penetration/aspiration, vallecular/pyriform sinus residue, regurgitation, or impaired swallowing coordination that reduces	Dysphagia present/absent	Categorical

No.	Variable	Operational Definition	Measurement Tool / Data Source	Measurement Procedure	Measurement Result	Data Type
				swallowing safety or efficiency.		
8	IDDSI bolus consistency	Bolus thickness used during assessment and training to standardize swallowing safety.	IDDSI Flow Test	Place 10 mL of liquid in a syringe, allow it to flow for 10 seconds, and record the remaining volume.	IDDSI level 3: moderately thick; IDDSI level 0: thin liquid	Categorical
9	Food thickener	A thickening agent added to food or drink to achieve the specified IDDSI consistency.	IDDSI protocol	Add thickener according to the specified amount until IDDSI level 3 is achieved.	IDDSI level 3 achieved/not achieved	Categorical
10	VFSS	Dynamic fluoroscopic examination used to assess PAS and hyolaryngeal excursion.	VFSS equipment	Conduct the examination in the lateral position using standardized boluses; analyze the recording for PAS, residue, and hyolaryngeal excursion.	VFSS recording and quantitative/qualitative parameters	Assessment method, not an outcome variable
11	PAS	An 8-point scale used to assess bolus penetration into and aspiration into the airway, as well as the response to clearance.	VFSS	Rated based on the VFSS recording.	Score 1–8	Numerical
12	Hyolaryngeal excursion	Anterior and superior displacement of the hyoid–laryngeal complex during the pharyngeal phase of swallowing,	VFSS	Frame-by-frame analysis of VFSS, identifying the hyoid position at rest (baseline) and its maximum position during swallowing.	Millimeters (mm)	Numerical

No.	Variable	Operational Definition	Measurement Tool / Data Source	Measurement Procedure	Measurement Result	Data Type
		contributing to airway protection, epiglottic inversion, and upper esophageal sphincter opening.		Record X (anterior) and Y (superior) coordinates. HLE = $\sqrt{[(X_2 - X_1)^2 + (Y_2 - Y_1)^2]}$. X_1, Y_1 = hyoid position at rest; X_2, Y_2 = maximum anterosuperior position during swallowing.		
13	Quality of life related to head and neck symptoms and swallowing	Participant's subjective perception of the severity of symptoms/problems related to head and neck cancer, including pain, swallowing, speech, eating, social contact, sensory problems, dry mouth, thick saliva, coughing, analgesic use, nutritional supplementation, feeding tube use, and weight change over the previous week. The swallowing domain specifically assesses difficulty swallowing liquids, soft foods, solid foods, and	Validated Indonesian version of the EORTC QLQ-H&N35	Participant completes the questionnaire before and after the intervention. Each item is scored according to the participant's response. The swallowing domain is calculated from the mean of the swallowing items and linearly transformed to a 0–100 scale according to the EORTC QLQ-H&N35 scoring manual.	Score 0–100; higher scores indicate more severe symptoms or head and neck problems and poorer symptom-related quality of life. Change score = post-intervention score minus pre-intervention score; a negative value indicates improvement.	Numerical

No.	Variable	Operational Definition	Measurement Tool / Data Source	Measurement Procedure	Measurement Result	Data Type
		choking while swallowing.				
14	Conventional swallowing exercises	A dysphagia rehabilitation program using one primary exercise modality, generally focusing on suprahyoid muscle strengthening, hyolaryngeal excursion, upper esophageal sphincter opening, tongue-base retraction, and pharyngeal-phase efficiency.	Hyolaryngeal excursion and PAS score	Hyolaryngeal excursion is assessed by frame-by-frame VFSS analysis, identifying the hyoid position at rest (baseline) and its maximum position during swallowing. Record X (anterior) and Y (superior) coordinates. HLE = $\sqrt{[(X_2 - X_1)^2 + (Y_2 - Y_1)^2]}$. PAS is rated from the VFSS recording.	Hyolaryngeal excursion in mm; PAS score 1–8 (scores 1–2: mild; 3–5: moderate; 6–8: severe)	Nominal
15	Structured swallowing exercises	A multimodal, systematic, and progressive dysphagia rehabilitation approach intended to optimize all biomechanical aspects of swallowing by integrating tissue mobility, flexibility, range-of-motion exercises, muscle	Hyolaryngeal excursion and PAS score	Hyolaryngeal excursion is assessed by frame-by-frame VFSS analysis, identifying the hyoid position at rest (baseline) and its maximum position during swallowing. Record X (anterior) and Y (superior) coordinates. HLE = $\sqrt{[(X_2 - X_1)^2 + (Y_2 - Y_1)^2]}$. PAS is rated from the VFSS recording.	Hyolaryngeal excursion in mm; PAS score 1–8 (scores 1–2: mild; 3–5: moderate; 6–8: severe)	Nominal

No. Variable	Operational Definition	Measurement Tool / Data Source	Measurement Procedure	Measurement Result	Data Type
	strengthening, neuromuscular coordination, swallowing integration, and respiratory–swallow coordination.				

1.8 Study Variables

Independent variables: **conventional swallowing therapy and structured swallowing therapy**

Dependent variables: **PAS score, hyolaryngeal excursion, and quality of life in patients with NPC**

1.9 Study Procedures

1. Study Preparation

a. The investigator will obtain ethical approval from the Research Ethics Committee of the Faculty of Medicine, Universitas Indonesia.

b. The investigator and research team will prepare the study instruments, data collection forms, participant information sheet, informed consent form, and educational materials, including a video and leaflet on swallowing exercises.

c. The investigator will train the research team and standardize all assessment and intervention procedures.

2. Participant Recruitment

a. The research team will screen potential participants according to the predetermined inclusion and exclusion criteria.

b. Eligible participants will be informed about the study objectives, procedures, potential benefits, and risks.

c. Participants who agree to take part will complete the study form and sign the informed consent form.

d. The study participants will be allocated to two groups following the GUSS, VFSS, and quality-of-life assessments: the control group (conventional swallowing exercises) and the intervention group (structured swallowing exercises).

e. Participants will be allocated using stratified block random sampling. The population will first be divided into homogeneous subgroups (strata) according to dysphagia severity. Each participant will then be assigned a number, and the numbers within each stratum will be randomized using computer software to allocate participants to the structured or conventional swallowing exercise group.

3. Data Collection and Management

a. Baseline characteristics (age, sex, body weight, height, body mass index, MMSE score, NPC stage, dysphagia status, and radiotherapy status) will be recorded using a double-blind procedure. Each participant will be assigned a study identification code to protect confidentiality and mask group allocation. All study data will subsequently be recorded and managed using these codes.

b. The swallowing history and physical examination at weeks 0, 4, and 8 will be documented using a double-blind procedure. Research team members conducting the assessments will not be informed of participants' allocation to the intervention or control group. All findings will be recorded using study identification codes.

c. The PAS scores and hyolaryngeal excursion measurements obtained using VFSS at weeks 0 and 8 will be assessed using a double-blind procedure. The VFSS recordings will be assigned unique codes to ensure that the research team members conducting the assessments are unaware of the participants' identities, group allocations, and assessment time points. PAS scores and hyolaryngeal excursion will be evaluated based on these coded VFSS recordings. The assessments will be performed independently by two radiologists with expertise in VFSS interpretation and hyolaryngeal excursion measurement. Both assessors will be blinded to the participants' group allocations and to each other's assessment results. The Siemens Healthcare Luminos Agile® VFSS system will be used to calculate hyolaryngeal excursion using computerized measurement.

d. Quality of life, assessed using the EORTC QLQ-H&N35 at weeks 0 and 8, will be documented using a double-blind procedure. The questionnaires will be specially coded so that research team members assessing the results are unaware of participants' identities, group allocations, and assessment time points.

e. If the two assessors' PAS or hyolaryngeal excursion measurements exceed the predefined agreement threshold, the recordings will be reassessed independently. If disagreement in PAS scores persists after reassessment, a third independent assessor will adjudicate. If disagreement in hyolaryngeal

excursion persists, the mean of the two assessors' measurements will be calculated.

f. Group allocation will be held by a research team member who is not involved in outcome assessment. Outcome assessors will remain unaware of participants' allocation to the control or intervention group. Data provided for analysis will be labelled with group codes so that the analyst remains unaware of group identities throughout the analysis. The allocation codes will be unblinded after data collection, verification, and analysis have been completed.

4. Conventional and Structured Swallowing Program Implementation

a. The research team will administer conventional swallowing exercises, consisting of the CTAR exercise and isometric neck flexion–extension exercise. Each session will last 30 minutes and will be conducted twice weekly at the hospital for 8 weeks, with home exercises three times weekly in the control group.

i. CTAR exercise: The participant sits upright and relaxed in a chair. A small rubber ball (e.g., a tennis or therapy ball) is placed under the chin, between the chin and sternum. The participant presses the chin downward against the ball slowly and firmly until the chin approaches the chest, holding the position for 60 seconds. The pressure is then released, the starting position is resumed, and the participant rests for 1–2 minutes. Repeat three times daily. The exercise is performed twice weekly, with an isometric dose of 3 cycles × 60 seconds and an isotonic dose of 2 cycles × 30 repetitions, repeated for 3 sets per day.

ii. Isometric neck extension/flexion exercise: The participant sits upright and looks straight ahead. The hands are clasped behind the head at the crown. The participant pushes the head backward against the hands, which provide resistance and prevent movement. Hold the muscle contraction for 5–10 seconds. Then place both palms on the forehead and push the head forward against the hands, again preventing movement. Hold for 5–10 seconds. Perform 3 sets per day, with 10–15 repetitions per set.

b. The research team will administer structured swallowing exercises comprising isometric neck extension/flexion, jaw-opening exercises, jaw

range-of-motion exercises, tongue range-of-motion exercises, CTAR, the Mendelsohn maneuver, and diaphragmatic breathing. Each session will last 30 minutes and will be conducted twice weekly at the hospital for 8 weeks, with home exercises three times weekly in the intervention group.

i. Jaw-opening exercise: Open the mouth as widely as possible and hold for 10 seconds, then rest for 10 seconds. Next, protrude the tongue as far as possible for 10 seconds, then rest. Repeat this sequence five times for two sets.

ii. Jaw range-of-motion exercise: Sit upright and open the mouth as widely as possible; hold for 5–10 seconds, then close slowly. Move the jaw to the right and hold for 5 seconds, then move it to the left and hold for 5 seconds. Repeat 10–15 times per set. Perform 3 sets daily.

iii. Tongue range-of-motion exercise: Protrude the tongue forward, retract it, move it to the right and left, and elevate and depress it. Perform each movement 5–10 times, holding each position for 6–10 seconds. Complete 3–5 sets daily.

iv. Mendelsohn maneuver: The participant sits upright and relaxed and locates the Adam's apple (thyroid cartilage). The participant begins by swallowing saliva normally. When the Adam's apple reaches its highest position, the participant holds it there for 3–5 seconds and then rests. If maintaining the position using the neck muscles is difficult, the participant may place the fingers on the front of the neck to help hold the larynx elevated. Repeat 5–10 times per set and perform 3 sets daily.

v. Diaphragmatic Breathing Exercise: The participant lies in a supine position with the knees flexed and supported by a pillow, and the head supported by a pillow. One hand is placed on the chest and the other on the abdomen, just below the rib cage. The participant inhales, allowing the abdomen to expand and the hand placed on the abdomen to rise. The abdominal muscles are then tightened, allowing the abdomen to lower, followed by exhalation through pursed lips. The exercise consists of 10–15 breathing cycles per set, with three sets performed daily. Exercise intensity may be increased by adding weight to the abdomen, such as a book.

c. Swallowing exercises will be discontinued if the patient experiences difficulty breathing, severe coughing or choking, a sensation of suffocation, unstable vital signs, or pain or discomfort in the neck or chest.
d. The intervention will be supported by caregiver assistance, provision of swallowing exercise videos and leaflets to participants and caregivers, and video-call monitoring to promote and verify adherence to the exercises.

5. **Data Analysis**
6. **Presentation of Study Results**
    - The findings will be presented systematically in tables, figures, and narrative descriptions in accordance with the study objectives.

1.10 Study Flowchart

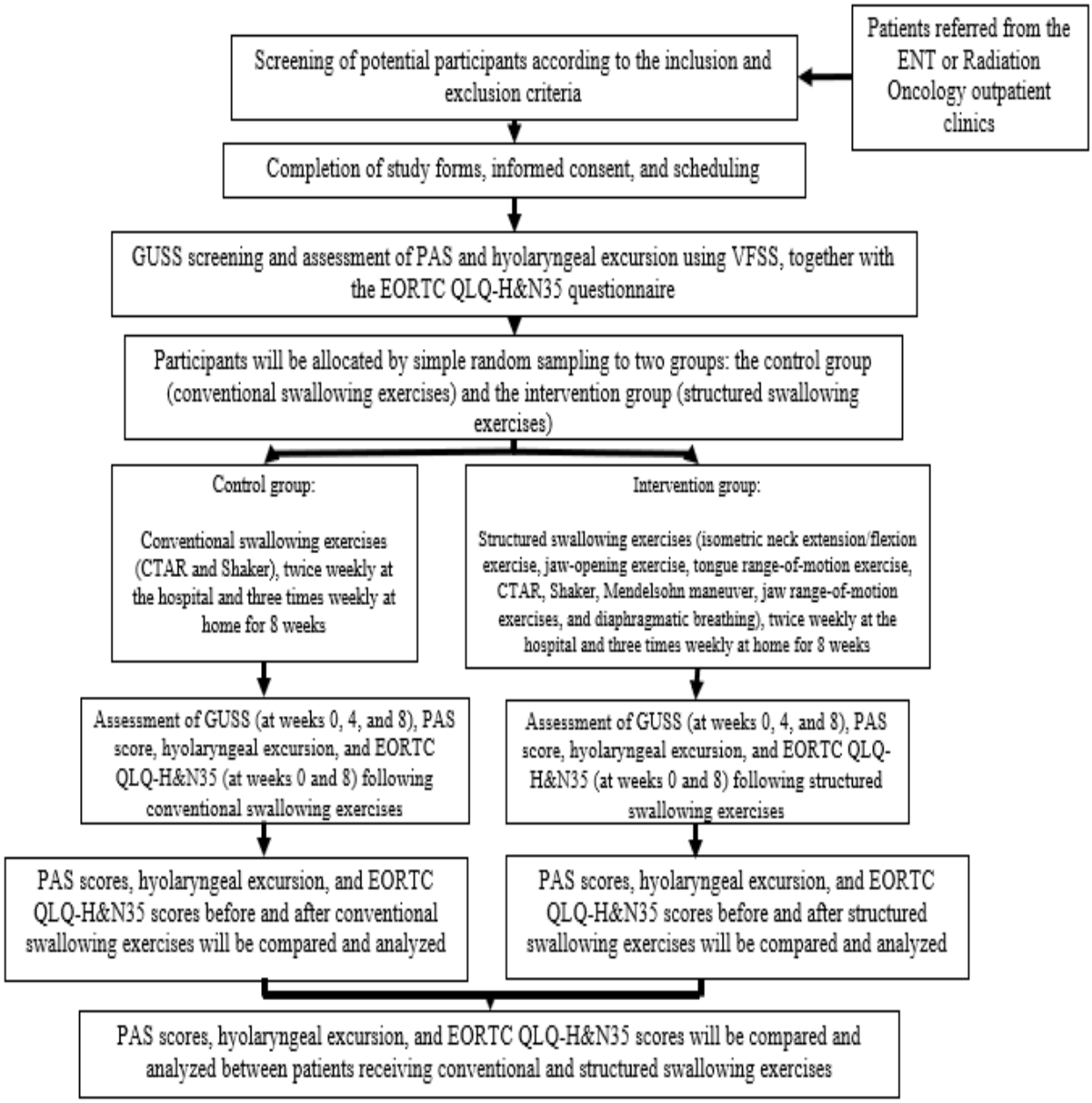


Figure 3.1. Study Flowchart

1.11 Data Analysis Plan

Intervention delivery and data collection will take place from August 2026 to January 2027. Data will be processed using Microsoft Excel and analysed using Statistical Package for the Social Sciences (SPSS), version 31. Hypotheses will be tested using a bivariate unpaired t-test. If the data are not normally distributed, the Mann–Whitney U test will be used. Repeated-measures ANOVA will also be performed. A p-value of <0.05 will be considered indicative of a statistically significant difference in means.

1.12 Research Ethics

An application for ethical approval will be submitted to the Research Ethics Committee of the Faculty of Medicine, Universitas Indonesia. The study will adhere to four ethical principles: respect for autonomy, beneficence, non-maleficence, and justice.

1. Respect for Autonomy

   The investigator will respect prospective participants' rights by providing information about the study objectives, benefits, potential harms, and procedures. Participants who agree to take part will sign the provided informed consent form. All participant data and information will be kept confidential. Participants may withdraw from the study if they feel that participation is causing them harm.

2. *Beneficence*

   This study may benefit patients with nasopharyngeal carcinoma and swallowing difficulties by providing exercises intended to rehabilitate swallowing function and improve quality of life.

3. *Non-maleficence*

   The study will be conducted in accordance with established standard operating procedures, including an explanation of any discomfort that participants may experience during the study.

4. *Justice*

   All study participants will have equal rights and will be afforded legal protection in the event of errors in study implementation.