

“Effectiveness of a Nurse-Led Multicomponent Intervention Programme on Dysphagia and Oral Feed Readiness Among Post-Extubated Children: A Quasi-Experimental Study”

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Abstract

Background: Post-extubation dysphagia is a common complication among critically ill children following mechanical ventilation. It may delay oral feeding, increase aspiration risk, prolong hospitalization, and impair nutritional recovery. Early nursing interventions can support swallowing recovery and improve feeding outcomes. **Aim:** To evaluate the effectiveness of a nurse-led multicomponent intervention programme in reducing dysphagia and improving oral feed readiness among post-extubated children. **Methods:** A quantitative quasi-experimental study with a pretest-posttest control group design was conducted among 20 post-extubated children admitted to a Pediatric Intensive Care Unit. Baseline dysphagia and oral feed readiness were assessed using a standardized tool. The experimental group received a structured nurse-led multicomponent intervention programme, while the control group received routine care. Outcomes were evaluated daily for five consecutive days. Data were analyzed using descriptive and inferential statistics, with significance set at $p < 0.05$. **Results:** At baseline, severe dysphagia was present in 80% of children in the experimental group and 90% in the control group. Following the intervention, the experimental group showed a marked improvement in oral feed readiness, with mean scores increasing from 9.3 on Day 1 to 16.1 on Day 5. While in the control group, it improved from 8.8 to 11.7. Significant differences were observed between groups highly significant by Days 3–5 ($p < 0.001$). By Day 5, no child in the experimental group had severe dysphagia, whereas 30% of children in the control group continued to experience severe dysphagia. **Conclusion:** The nurse-led multicomponent intervention programme effectively reduced dysphagia and improved oral feed readiness among post-extubated children.

Keywords: Post-extubation dysphagia, oral feed readiness, pediatric intensive care, nurse-led intervention, swallowing rehabilitation.

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Introduction

Post-extubation dysphagia (PED) is a common complication that occurs following the removal of an endotracheal tube, particularly among critically ill patients who have undergone prolonged mechanical ventilation. It is characterized by difficulty in swallowing, which may interfere with the safe passage of food and liquids from the oral cavity to the stomach. Swallowing dysfunction after extubation can result in aspiration, delayed oral feeding, malnutrition, prolonged hospitalization, and increased healthcare costs (1,2).

The reported prevalence of PED varies widely, ranging from 3% to 93%, depending on the patient population, duration of intubation, and assessment methods used (2). Studies have shown that approximately 41% of critically ill patients who remain intubated for 48 hours or longer develop

swallowing difficulties following extubation (3). Tsai et al. reported that swallowing impairment frequently occurs within 48 hours after extubation, and some patients continue to require enteral feeding because of persistent dysphagia (1).

Several physiological mechanisms contribute to the development of PED. These include laryngeal trauma, vocal cord injury, mucosal inflammation, reduced laryngeal sensation, impaired airway protection, and weakness of the oropharyngeal muscles associated with prolonged intubation (4). Such alterations may compromise swallowing safety and increase the risk of aspiration-related complications.

Recent studies have demonstrated that swallowing dysfunction remains prevalent both immediately after extubation and at the time of intensive care unit discharge (5). Among critically ill trauma patients, swallowing impairment has been reported

in up to 50% of individuals following prolonged mechanical ventilation (6). Persistent dysphagia has also been associated with increased rates of pneumonia, delayed nutritional recovery, and higher mortality (3).

The burden of PED has received increasing attention in recent years. A systematic review and meta-analysis conducted in 2024 highlighted that PED continues to be a significant challenge in critical care and is strongly associated with adverse clinical outcomes, including aspiration, malnutrition, and extended hospital stay (7). Similarly, a recent review emphasized that despite its high prevalence, PED remains under-recognized and underdiagnosed in many intensive care settings (8).

Evidence from pediatric studies suggests that children who require prolonged ventilatory support are particularly vulnerable to developing swallowing dysfunction after extubation. A recent pediatric study reported that post-extubation swallowing difficulties can delay the initiation of oral feeding and negatively affect recovery among critically ill children (9). Another investigation among pediatric trauma patients highlighted the importance of early screening and intervention to reduce feeding-related complications and improve functional outcomes (10).

Current evidence supports the use of structured screening protocols and multidisciplinary approaches for the management of PED. Flexible Endoscopic Evaluation of Swallowing (FEES) has emerged as a valuable tool for identifying swallowing abnormalities and guiding individualized rehabilitation strategies (11). Furthermore, nurse-led interventions focusing on swallowing assessment, oral-motor stimulation, positioning, oral hygiene, and progressive feeding have shown promise in improving swallowing function and oral feed readiness (3,8).

Given the substantial impact of PED on recovery and nutritional outcomes, there is a growing need for evidence-based interventions that facilitate a safe transition to oral feeding among post-extubated children. Therefore, the present study was undertaken to evaluate the effectiveness of a nurse-led multicomponent intervention programme in reducing dysphagia and enhancing oral feed readiness among post-extubated children.

Methodology:

A quasi-experimental study conducted in the pediatric ICU in selected hospital Delhi from September 2025 to December 2025. A convenient sample technique used to select the participant and a simple random technique was used to allocate the participant in experimental and control group. Sample size is 20 for the pilot study. In the study, post-extubation hemodynamically stable children (6-18) years who are suffering with dysphagia were included in the study while child with tracheostomy

and oral surgery and contraindicated for NLMP were excluded from the study.

Data collection process:

For the study, post-extubated children were selected using a convenient sampling technique. After obtaining informed consent, demographic data and baseline clinical characteristics were collected. Participants were then randomly assigned to either the experimental or control group. A pre-test assessment of dysphagia was conducted using the Gugging Swallowing Screen (GUSS), and children were categorized as having mild, moderate, or severe dysphagia. The experimental group received the Nurse-Led Multimodal Intervention Program (NLMP), which included oral care, salivary gland massage, swallowing-oriented exercises, and swallowing education from Day 1 to Day 5. The control group received routine hospital standard care. Post-test assessments were conducted daily from Day 2 to Day 5, prior to the intervention, to evaluate dysphagia status and oral feeding readiness among the participants.

Data analysis:

The collected Data organized systematically and coded on excel sheet. This is quantative research, for this we used statistical tools e.g. SPSS (Statistical Package for Social Science) statcal package version20. Graphics used Excel program. Descriptive data was expressed in form of mean, frequency, percentage and standard deviation and inferential statistics e.g., chi-squared, person's r t-test used for comparison between the two groups. A statically significance difference used if P – value 0.05

Results:

The study evaluated the effectiveness of a Nurse-Led Multicomponent Intervention Programme (NLMP) in reducing dysphagia and improving oral feed readiness among post-extubated children. At baseline, both the experimental and control groups were comparable with respect to demographic and clinical characteristics. Pretest assessment revealed that the majority of children in both groups had severe dysphagia (80% in the experimental group and 90% in the control group), indicating poor oral feed readiness. The mean pretest dysphagia and oral feed readiness scores were 9.1 ± 0.567 in the experimental group and 8.7 ± 1.68 in the control group, with no statistically significant difference between the groups ($p = 0.868$).

Following implementation of the intervention, the experimental group demonstrated a steady improvement in oral feed readiness scores from Day 1 (9.3) to Day 5 (16.1). In contrast, the control group showed only modest improvement, with mean scores increasing from 8.8 on Day 1 to 11.7 on Day 5. By Day 5, 20% of children in the experimental group achieved no dysphagia status

and 50% had slight dysphagia, whereas none of the children in the control group achieved no dysphagia and only 20% had slight dysphagia. Independent t-test analysis revealed statistically significant differences between the experimental and control groups from Posttest Day 1 onwards ($p < 0.05$). The greatest improvement was observed on Posttest Day 4 (mean difference = 5.5, $t = 9.13$, $p < 0.0001$). Paired t-test analysis within the experimental group also demonstrated significant improvement in oral feed readiness from Day 2 onwards, confirming the effectiveness of the intervention. No significant association was found between pretest dysphagia scores and selected demographic variables such as age, gender, educational status, monthly income, and nutritional status ($p > 0.05$).

Table 1: Demographic Table in frequency and percentage
n=20

Variable	Category	EXPRIMNT AL GROUP		CONTRO L GROUP	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Gender	Male	4	40%	6	60%
	Female	6	60%	4	40%
Age (years)	6–8	3	30%	3	30%
	9–11	3	30%	3	30%
	12–14	2	20%	3	30%
	15–17	2	20%	1	10%
Education Status	Illiterate	2	20%	1	10%
	Primary	1	10%	5	50%
	Secondary	4	40%	3	30%
	High School	3	30%	1	10%
Monthly Income	≤20,000	2	20%	3	30%
	20,001–30,000	2	20%	3	30%
	30,001–40,000	1	10%	1	10%
	>40,001	5	50%	3	30%
Nutritional Status	15–17	3	30%	3	30%
	17.1–19	1	10%	3	30%
	19.1–21	4	40%	2	20%

	21.1–23	2	20%	2	20%
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Table 2: clinical characteristics variable of the subjects in both groups . N=20

Variable	Category	EXPRIMNT AL GROUP		CONTROL GROUP	
		Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Diagnosis	DKA	2	20%	1	10%
	CKD	1	10%	1	10%
	Diphtheria	1	10%	1	10%
	Meningitis	1	10%	1	10%
	Dengue Shock	1	10%	1	10%
	Septic Shock	1	10%	1	10%
	ARDS	1	10%	1	10%
	Severe Pneumonia	1	10%	2	20%
Sepsis		1	10%	1	10%
Ability to Sit	Yes	10	100%	10	100%
	No	0	0%	0	0%
Duration of Mechanical Ventilation	≤5 days	3	30%	4	40%
	6–10 days	2	20%	5	50%
	>10 days	5	50%	1	10%
ET Tube Size	5.5	4	40%	1	10%
	6.0	2	20%	3	30%
	6.5	3	30%	2	20%
	Others	1	10%	4	40%
O ₂ Therapy	Prongs	4	40%	3	30%
	Mask	2	20%	2	20%
	Nasal	1	10%	2	20%
	Venturi	1	10%	1	10%
	None	2	20%	2	20%
Co-morbidities	Nil	4	40%	1	10%
	Asthma	1	10%	4	40%
	Cough	1	10%	1	10%

	Seizures	1	10%	1	10%
	Anemia	1	10%	1	10%
	Bronchopneumonia	1	10%	1	10%
	Malnutrition	1	10%	1	10%
Length of Sedation	≤7 days	3	30%	4	40%
	8–12 days	4	40%	5	50%
	>12 days	3	30%	1	10%

Table 3 Pre- test to assess the level of dysphagia and oral feed readiness among post-extubated children in experimental and control group. N=20

S . N .	Level of dysphagia and oral feed readiness	Criteria	Exp. group (n=10)		Control group (n=10)	
			Frequency	%	Frequency	%
1	No dysphagia	20	0	0%	0	0%
2	Slight dysphagia	15 – 19	0	0%	0	0%
3	Moderate dysphagia	10 – 14	2	20%	1	10%
4	Severe dysphagia	0 – 9	8	80%	9	90%

Table 4: Level of post-test dysphagia and oral feed readiness between the experimental and control group among post-extubated children. N = 20

S . N .	Level of dysphagia and oral feed readiness	Experimental group (n=10)					Control group (n=10)				
		D1	D2	D3	D4	D5	D1	D2	D3	D4	D5
1	No dys	0	0	0	1	2	0	0	0	0	0

	phagia										
2	Slight dysphagia	0	0	3	6	5	0	0	0	1	2
3	Moderate dysphagia	2	4	6	3	3	1	1	2	2	5
4	Severe dysphagia	8	6	1	0	0	9	9	8	7	3

Table 5: Comparison of pretest-post-test data in exp. and control group. (N=20)

Comparison time	Experimental group mean	Control group mean	Mean difference	t test value	P value*	Result
Pretest	9.1	8.7	0.4	0.169	0.868	NS
Posttest day 1	9.3	8.8	0.5	2.37	0.029	Sig
Posttest day 2	10.1	9.2	0.9	3.58	0.002	Sig
Posttest day 3	13.5	9.3	4.2	6.41	<0.001	Sig
Posttest day 4	15.5	10	5.5	9.13	<0.001	Sig
Posttest day 5	16.1	11.7	4.4	4.24	0.005	Sig

Table 6 Comparison of mean oral feed readiness scores across different time intervals using paired t-test among experimental group (n=10)

Time interval	Mean difference	t test value	P value	Result
Pretest – posttest day 1	0.2	0.535	0.599	Non Sig
Pretest – posttest day 2	1.0	3.281	0.004	Sig
Pretest – posttest day 3	4.4	2.905	0.009	Sig

Pretest – posttest day 4	6.4	5.058	<0.0001	Sig
Pretest – posttest day 5	7.0	9.249	<0.0001	Sig
Posttest day 1 - posttest day 2	0.8	2.108	0.049	Sig
Posttest day 1 - posttest day 3	4.2	5.704	<0.0001	Sig
Posttest day 1 - posttest day 4	6.2	7.438	<0.0001	Sig
Posttest day 1 - posttest day 5	6.8	6.619	<0.0001	Sig
Posttest day 2 - posttest day 3	3.4	4.904	<0.0001	Sig
Posttest day 2 - posttest day 4	5.4	8.307	<0.0001	Sig
Posttest day 2 - posttest day 5	6.0	7.147	<0.0001	Sig
Posttest day 3 - posttest day 4	2.0	3.481	0.002	Sig
Posttest day 3 - posttest day 5	2.6	6.339	<0.0001	Sig
Posttest day 4 - posttest day 5	0.6	3.204	0.005	Sig

Table 7: Association between pretest score and selected demographic variables among experimental group (n=10)

S N .	Variabl es	Level of dysphagia		Tes t val ue	d f	P val ue	res ult
		Mode rate	Sev ere				
1	Age	12.5	10.06	0.572	-	0.574	NS
2	Sex			NA	1	NA	NA
	Male	1	4				
	Female	1	4				

4	Educati onal Status			0.833	3	0.416	NS
	Illiterat e	0	1				
	Primar y	1	4				
	Second ary	1	2				
	Higher	0	1	1.875	3	0.09	NS
5	Monthl y Income						
	10,000 - 20,000 Rs	0	2				
	20,001 - 30,000 Rs	1	1				
	30,001 - 40,000 Rs.	0	1				
	≥ 40001R s.	1	4	0.104	1	0.919	NS
6	Nutritio nal status (BMI)						
	less than 18.5	1	3				
	18.5 to 24.9	1	5				
	25 to 29.9	0	0				
	30 to 34.9	0	0				

Discussion

Post-extubation dysphagia (PED) is a common complication among critically ill children following prolonged mechanical ventilation and can significantly affect nutritional status, recovery, and quality of life. The present study evaluated the effectiveness of a Nurse-Led Multicomponent Intervention Programme (NLMIP) in reducing dysphagia and improving oral feed readiness among post-extubated children. Baseline assessment revealed that the majority of children in both experimental and control groups experienced severe dysphagia, indicating a high burden of swallowing dysfunction after extubation. These findings are consistent with previous studies that reported a high prevalence of PED among pediatric intensive care patients (9). Following

implementation of the intervention, children in the experimental group demonstrated a gradual and consistent improvement in oral feed readiness and swallowing function from Day 1 to Day 5. The improvement observed may be attributed to the combined effect of oral care, salivary gland stimulation, swallowing exercises, and feeding education provided under the intervention programme. Similar findings were reported by Siao et al., who found that structured swallowing rehabilitation and oral care interventions significantly improved swallowing outcomes among critically ill patients (3). The reduction in dysphagia severity among children receiving the intervention supports existing evidence emphasizing the importance of early identification and management of swallowing difficulties. Mpouzika and Lordanou highlighted that timely dysphagia screening and multidisciplinary interventions can reduce complications and facilitate earlier return to oral feeding (5). Likewise, Yu et al. reported that early rehabilitation strategies are effective in improving swallowing recovery and nutritional outcomes among patients with post-extubation dysphagia (7). By the end of the intervention period, none of the children in the experimental group remained in the severe dysphagia category, whereas several children in the control group continued to experience swallowing difficulties. These findings are further supported by Bertschi et al., who emphasized that comprehensive interventions such as oral stimulation, swallowing exercises, and individualized feeding strategies play a significant role in restoring swallowing function (8). No significant association was found between pretest dysphagia severity and selected demographic variables. This finding is in agreement with Tsai et al., who reported that clinical factors such as duration of intubation, severity of illness, and mechanical ventilation exposure are more strongly associated with post-extubation dysphagia than demographic characteristics (1).

Overall, the findings suggest that the Nurse-Led Multicomponent Intervention Programme is an effective, safe, and feasible nursing intervention for improving swallowing ability and oral feed readiness among post-extubated children. Early implementation of structured nurse-led dysphagia management protocols may promote faster recovery, improve feeding outcomes, and reduce complications in pediatric intensive care settings. The findings of the present study demonstrate that the Nurse-Led Multicomponent Intervention Programme significantly improved swallowing function and oral feed readiness among post-extubated children. Before the intervention, most children in both groups exhibited severe dysphagia, highlighting the high prevalence of swallowing difficulties following prolonged endotracheal

intubation. The progressive increase in mean oral feed readiness scores in the experimental group suggests that interventions such as oral care, salivary gland massage, swallowing-oriented exercises, and swallowing education play an important role in restoring swallowing function. The rapid transition of children from severe dysphagia to moderate, slight, and no dysphagia categories further supports the effectiveness of the intervention.

Conclusion:

The present study demonstrated that the Nurse-Led Multicomponent Intervention Programme was effective in reducing post-extubation dysphagia and improving oral feed readiness among critically ill children. The findings highlight the important role of nurses in the early identification and management of post-extubation dysphagia. Early implementation of structured nurse-led interventions can promote swallowing recovery, facilitate the transition to oral feeding, reduce the risk of feeding-related complications, and contribute to improved nutritional and clinical outcomes. Therefore, integrating nurse-led dysphagia assessment and management protocols into routine pediatric intensive care practice may enhance the quality of care and support faster recovery among post-extubated children.

Limitations: The present study was conducted in a single setting with limited sample size. The follow-up was limited to five days. Due to limited sample size, findings cannot be generalized to all pediatric patients. The instrumental swallowing assessments were not performed.

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