Reproducibility of Distanced Swallowing Assessment with Swallis DSA™ Device Compared with In-person Assessment for Older Adults In Nursing Home

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Introduction

- There is a lack of swallowing experts in nursing homes [1].
- Swallis Medical developed a **tele-expertise system** to collect data from a recorded video of a meal synchronised with a high-resolution cervical auscultation device:
  1. Necklace installed by the NH staff on the patient's neck **(Fig.1)**.
  2. Sounds and vibrations of swallowing (and other events) recorded with the necklace, and subject's behavior recorded by the webcam **(Fig.2)**.
- **Aim of the study:** Compare the reproducibility of the recommend-dations of the distanced vs in-person swallowing assessment.

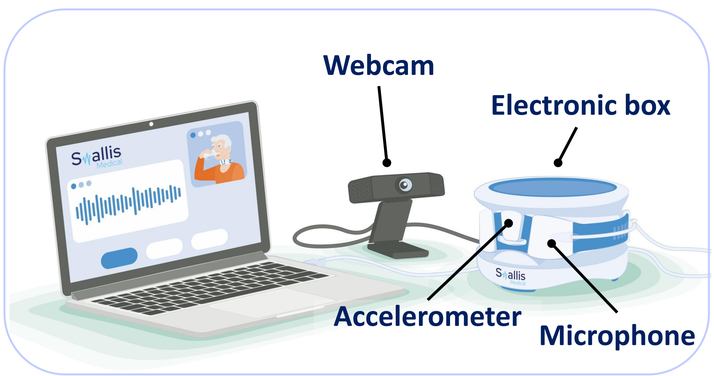

Figure 1: Swallis DSA™ device

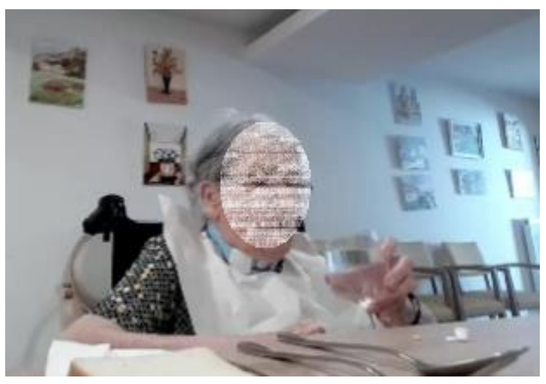

Figure 2: Webcam view

Methods

- Patient population: **Residents at risk of dysphagia (>60 y)**.
- **Reproducibility** between the swallowing assessment carried out in the presence of the patient *vs* remote evaluation:
  - With the inter-rater agreement with 2 independent speech language therapists (SLT)
  - From their observations based on the Mealtime Assessment Scale (MAS) [2], and their recommendations for management.
- Data on the acceptability of the procedure by the patient and the caregiver responsible for the recordings was also collected.

1. Recording of mealtime with the Swallis DSA ™ device and clinical SLT observation in-person

2. Remote analysis by the second SLT of recorded meal

Figure 3: Study design

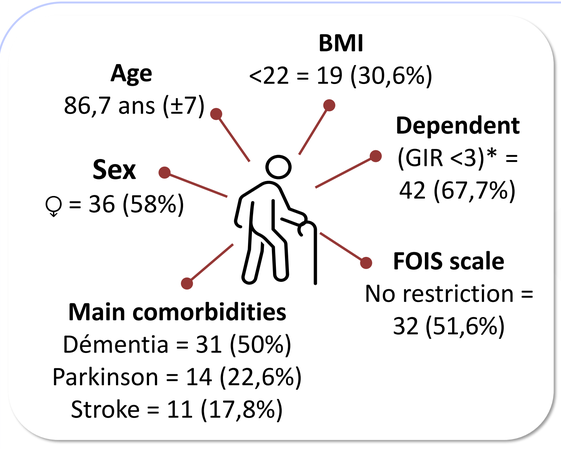

Figure 4: Description of included NH residents (n=62)

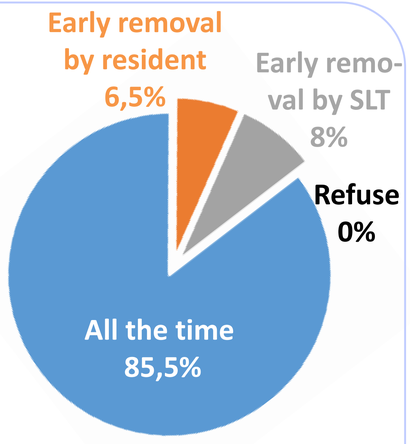

Figure 5: Resident compliance

Table 1: Bivariate analysis Training staff-Usability of device

	No prior training	Prior training	p	1st use	>1 use	p
N (%)	30 (48 %)	32 (52 %)		40 (64 %)	22 (36%)	
Difficulties to use device	17 (57 %)	6 (19 %)	**0.002**	21 (53 %)	2 (9 %)	**0.002**
N (%)	30 (68 %)	14 (32 %)		40 (64 %)	22 (36%)	
Needs help to use device	24 (80 %)	7 (50 %)	**0.000**	30 (75 %)	1 (5 %)	**0.000**

Fisher's exact test

Results

- 62 residents were recruited in 6 nursing homes **(Fig.4)**. Most residents could wear the device during the entire meal (27 min. ± 13,4). Device removed before the end of the meal by 4 residents (6,5%) or on the SLT's initiative when length of observations was deemed sufficient **(Fig.5)**.
- Prior training of NH staff and repeated device use significantly diminish the help needed **(Tab.1)**.
- Even remotely, the SLT was able to give recommendations for each resident **(Tab.2)**.
- Concordance of almost 70% on dietary recommendations when comparing each resident **(Tab.3)**. Disagreement correlated with the observability of certain MAS-specific items **(Fig.6)**.

Table 2: Comparative analysis of the recommendation of the 2 SLT assessments (n=62)

	SLT in-person	SLT remotely	p
Need for assistance with meals	28 (45.2%)	30 (48.4%)	0.617
Dental consultation request	15 (24.2%)	16 (25.8%)	0.841
Oral hygiene care	9 (14.5%)	7 (11.5%)	0.563
Adaptation of food/drinks	14 (22.6%)	15 (24.2%)	0.818
Adaptation of environment	23 (37.1%)	21 (33.9%)	0.654
Modification of posture	24 (38.7%)	23 (37.1%)	0.847

Mac Nemar's test

Table 3: Agreement between SLTs about alimentary adaptation

		2nd SLT		% Agreement
		No	Yes	
1st SLT	No	5	9	69.3 %
	Yes	10	38	

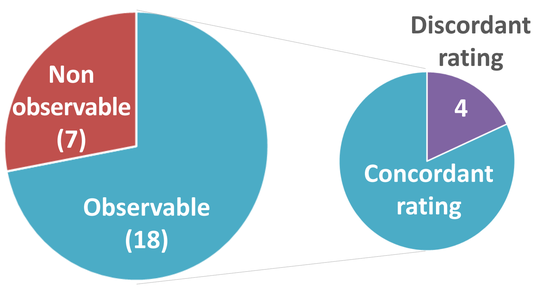

Figure 6: Quality of remote observation and scoring of MAS (25 items)

Conclusion

- Clinical assessment of dysphagia using the Swallis DSA™ device in usual living context would represent a feasible alternative to face-to-face assessment.
- Optimising data collection procedure from identified discrepancies in observations should make it possible to increase the concordance rate for recommendations.
- A more in-depth analysis of the vibro-acoustic signals should complete the swallowing assessment with objective measures of the pharyngo-laryngeal mechanism.

(1) Engh MCN, Speyer R. Management of Dysphagia in Nursing Homes: A National Survey. Dysphagia. 2021 Mar 4.

(2) Pizzorni N, Valentini D, Gilardone M, Borghi E, Corbo M, Schindler A. The Mealtime Assessment Scale (MAS): Part 1 – Development of a Scale for Meal Assessment. Folia Phoniatr Logop. 2020.

*GIR = Groupement Iso Ressource, GIR 2 =The older person is confined to bed or a chair, need help for activities of daily living.