Perspective

Implementation of dysphagia curriculum in dental education is important due to the high-aging rate society in Taiwan

Chuan-Hang Yu a,b*, Ming-Yung Chou a,b

a School of Dentistry, Chung Shan Medical University, Taichung, Taiwan
b Department of Dentistry, Chung Shan Medical University Hospital, Taichung, Taiwan

Received 7 October 2021; Final revision received 8 October 2021

Taiwan has become an aged society since March 2018, that is, people older than 65 years account for more than 14% of the total population. It was estimated that Taiwan will enter a super-aged society in 2025, that the proportion of people aged 65 years and over will be more than 20%. In Taiwan, pneumonia is the third leading cause of death among the elderly in 2019. The data also reveal an increased mortality rate from pneumonia of the higher aged group. Swallowing dysfunction or dysphagia is a highly prevalent clinical condition among the elderly. It affects up to 13% of the elderly population and 51% of institutionalized older persons. Dysphagia may cause pivotal impacts on general health, including aspiration pneumonia, malnutrition, and dehydration. A study has disclosed that dysphagia was highly associated with the occurrence of aspiration pneumonia in Taiwan. Since dysphagia is a crucial issue for the high-increasing aging population in Taiwan, the Ministry of Health and Welfare suggests to include swallowing training in the dental curriculum. (Department of Mental and Oral Health Issue No. 1051700064, 2016). In this article, we presented our 2-year experience developing dysphagia curriculum for fourth-year dental students.

Different models describe the process of eating and swallowing, including the five-stage ingestion and process models. In these models, the dentist may play a key role in at least two aspects, chewing ability and tongue muscle strength. When healthy subjects eat solid foods, the ingested foods are chewed to small pieces and are moistened with saliva to form a food bolus to prepare the subsequent swallowing procedure. The tongue plays two crucial roles during this food trituration process. First, it carries the foods onto the occlusal surface of posterior teeth for food processing. Second, when the food bolus is ready for swallowing, they are placed on the central part of the dorsum of the tongue, then the muscles of the tongue contract to squeeze the bolus into the pharynx. Since eating and swallowing is a consecutive process, patients cannot eat and swallow smoothly without good chewing and tongue function even though they have good swallowing.

Treatment for patients with dysphagia needs an interdisciplinary approach. However, dentists are seldom included in the team. The two important reasons are the lack of knowledge of swallowing and unawareness of the dentist’s role in the dysphagia field. Therefore, we developed a dysphagia curriculum for fourth-year dental students in 2017. In response to the government’s policy in 2016, the curriculum was the first one-credit and required course for dental students in Taiwan. The dysphagia curriculum involved traditional classes, online learning, and hands-on practice. The classes consisted of normal anatomy and physiology of swallowing, diagnosis and treatment.

* Corresponding author. School of Dentistry, Chung Shan Medical University, No. 110, Sec. 1, Chien-Kuo N. Rd, Taichung, 40201, Taiwan. Fax: +886 4 24759065.
E-mail address: tao2008@csmu.edu.tw (C.-H. Yu).

https://doi.org/10.1016/j.jds.2021.10.008
1991-7902/© 2021 Association for Dental Sciences of the Republic of China. Publishing services by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
of dysphagia, and oral hypofunction. The teaching materials, lecture videos, reference videos, and supplemental materials were available at the online platform of Chung Shan Medical University.\(^8\) We introduced oral hypofunction, which the Japanese Society of Gerodontology proposed in 2016, in the curriculum and made it the core content of hands-on practice. There were 7 measurement items of clinical signs and symptoms of oral hypofunction, including poor oral hygiene, oral dryness, reduced occlusal force, decreased tongue-lip motor function, decreased tongue pressure, decreased masticatory function, and deterioration of swallowing function.\(^9\) We decided to incorporate these into the curriculum because the concept of oral hypofunction involved both dental and swallowing knowledge and maybe a simple and easy gate entrance to the swallowing and dysphagia field for the dental students. The hands-on practice for students included maximum phonation time, repetitive saliva swallowing test, tongue coating index, oral diadochokinestes, tongue pressure measurement, and chewing force measurement. Besides, we demonstrated the swallowing procedures with two different kinds of swallowing models and fiberoptic endoscopic evaluation of swallowing for swallowing tests. With the teaching materials and methods mentioned earlier, we surveyed the dental students’ satisfaction with the curriculum in 2018 and 2019. Results showed that the pooling satisfaction rate is 99%, 97%, 96.5%, and 99.5% for the lectures, the online teaching materials, the hands-on practice, and the overall course, respectively (Table 1).

Taiwan is a high-aging rate society. Dentists should know more about the general health condition of the elderly, including dysphagia. We developed a new curriculum in swallowing and dysphagia for the dental students and received excellent feedback. We hope that the early implementation of the swallowing and dysphagia concept for dental students could increase the ability to diagnose and treat the elderly with dysphagia and improve their quality of life.

### Declaration of competing interest

The authors have no conflicts of interest relevant to this article.

### Acknowledgments

We want to thank Professor Takeshi Kikutani at the School of Life Dentistry at Tokyo, Nippon Dental University, and his staff at the Nippon Dental University Tama Oral Rehabilitation Clinic for their kind and valuable assistance in developing the dysphagia curriculum for the School of Dentistry, Chung Shan Medical University.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jds.2021.10.008.

### References

1. Populations projections for the Republic of China (taiwan). National Development Council; Aug. 2020. Available at, https://pop-proj.ndc.gov.tw/main_en/download.aspx?uid=4105&pids=4104 [Date accessed: September 29, 2021].
2. 2019 cause of death statistics. Ministry of Health and Welfare; Sep 2020. Available at, https://www.mohw.gov.tw/cp-4964-55572-2.html [Date accessed: September 29, 2021].
3. Cabre M, Serra-Prat M, Palomera E, Almirall J, Pallares R, Clave P. Prevalence and prognostic implications of dysphagia in elderly patients with pneumonia. Age Ageing 2016;11:189–208.
4. Wirth R, Dziewas R, Beck AM, et al. Oropharyngeal dysphagia in older persons – from pathophysiology to adequate intervention: a review and summary of an international expert meeting. Clin Interv Aging 2016;11:189–208.
5. Lo WL, Leu HB, Yang MC, Wang DH, Hsu ML. Dysphagia and risk of aspiration pneumonia: a nonrandomized, pair-matched cohort study. J Dent Sci 2019;14:241–7.
6. Leopold NA, Kagel MC. Dysphagia — ingestion or deglutition? A proposed paradigm. Dysphagia 1997;12:220–6.
7. Hillemae KM, Palmer JB. Food transport and bolus formation during complete feeding sequences on foods of different initial consistency. Dysphagia 1999;14:31–42.
8. Dysphagia, MOOCs of Chung Shan Medical University. Available at, http://moocs.csmu.edu.tw/course/307/intro [Date accessed: October 3, 2021].
9. Minakuchi S, Tsuga K, Ikebe K, et al. Oral hypofunction in the older population: position paper of the Japanese Society of Gerodontology in 2016. Gerodontology 2018;11:189–208.

### Table 1 Dental students’ satisfaction to the dysphagia curriculum.

| Items                        | Very satisfied | Satisfied | Neutral | Dissatisfied | Very dissatisfied |
|------------------------------|----------------|-----------|---------|--------------|------------------|
| Q1 The lectures              | 68             | 79        | 30      | 20           | 2                |
| Average                      | 74             | 25        | 1.5     | 0            | 0                |
| Q2 The online teaching materials | 63            | 77        | 34      | 20           | 3                |
| Average                      | 70             | 27        | 3       | 0            | 0                |
| Q3 The hands-on practice     | 66             | 86        | 27      | 14           | 7                |
| Average                      | 76             | 20.5      | 3.5     | 0            | 0                |
| Q4 The overall course        | 70             | 81        | 29      | 19           | 1                |
| Average                      | 75.5           | 24        | 0.5     | 0            | 0                |

\(^a\) Response rate: 71% (56/79) for 2018; 89% (70/79) for 2019.