ORIGINAL ARTICLE

An Evaluation of Clinical Dietitian's Perceptions of Telenutrition Quality and Associated Factors in Saudi Arabia

Noura M.S. Eid[1,2], Amal Shibli[1], Dalia Baoum[1], Raghad Alsulami[1], Sumia Enani[2,3], and Rana H. Mosli[1]

[1]*Department of Clinical Nutrition, Faculty of Applied Medical Sciences, King Abdulaziz University, Jeddah, Saudi Arabia*
[2]*King Fahd Medical Research Center, King Abdulaziz University, Jeddah, Saudi Arabia*
[3]*Department of Food and Nutrition, Faculty of Human Sciences and Design, King Abdulaziz University, Jeddah, Saudi Arabia*

Correspondence
Noura M.S. Eid
Department of Clinical Nutrition,
Faculty of Applied Medical Sciences,
King Abdulaziz University,
P.O. Box 80215, Jeddah, 21589
Kingdom of Saudi Arabia
e-M: ooaeid2@kau.edu.sa

Submission: 03 Mar. 2024
Accepted: 12 Mar. 2024

Citation
Eid NMS, Shibli A, Baoum D, Alsulami R, Enani S, Mosli RH. An Evaluation of Clinical Dietitian's Perceptions of Telenutrition Quality and Associated Factors in Saudi Arabia. JKAU Med Sci 2024; 31(1): 31–40. DOI: 10.4197/Med.31–1.4.

Abstract

Background: Telenutrition has been gaining popularity worldwide due to its feasibility and positive impact on improving lifestyle choices and patient outcomes. However, the telenutrition approach has not been sufficiently evaluated in Saudi Arabia. Specifically, clinical dietitian's perceptions and attitudes toward telemedicine in Saudi Arabia remain unknown.

Objectives: To assess dietitians' perception of telenutrition quality and examine associations with sociodemographic characteristics and work experience.

Methods: This was a descriptive cross-sectional study using a translated online survey comprising 36 questions distributed to 300 dietitians working in Saudi Arabia. The questions assessed the dieticians' demographic background, as well as their perception and challenges of telenutrition. All statistical analyses were done with SPSS version 25 using the Kolmogorov–Smirnov test.

Results: 108 clinical dietitians participated in the study. Of the respondents, 90 (83%) were female, and the mean age range was 25–34 years. The majority of respondents (n = 40; 63%) had experience providing phone and online consultations, with most (n = 35; 32.4%) covering referrals for weight loss/weight maintenance. The most common difficulties reported were a lack of anthropometric measures (n = 52; 48.1%) followed by technical difficulties (n = 19; 17.6%) and interpersonal or communication difficulties (n = 16; 14.8%) In addition, older client age was the only significant predictor of a higher phone counseling quality score.

Conclusion: Our findings demonstrated promising attitudes towards telenutrition despite its limitations, such as technical errors and the absence of nutrition assessment. However, the effectiveness and outcomes of telenutrition remain unknown and require further investigation.

Keywords

Telenutrition, Dietitians, Perception, Challenges, Quality

INTRODUCTION

Telenutrition has proliferated over the past few years, leading to a decrease in face-to-face counseling following the COVID-19 pandemic[1]. As COVID-19 spread in Saudi Arabia, the resulting lockdowns impacted healthcare services, as the latter shifted to be mostly remote rather than face-to-face. This virtual approach supported the population and may have relieved strains on those with limited healthcare resources by enhancing access to treatment at a reasonable cost[2]. Virtual nutrition counseling was one of the most commonly offered services during the lockdown[3], with its use increasing over time[4]. A cross-sectional study carried out in several Arab countries confirmed that health dietitians switched to the use of social/mass media platforms, transitioning from face-to-face consultation to telenutrition[5]. The Academy of Nutrition and Dietetics defines virtual nutrition counseling as telenutrition, which is "the interactive use of electronic information and telecommunications technologies by a registered dietitian (RD) to implement the nutrition care process with patients or clients in a remote location, within the provisions of the RD's state license as applicable"[6]. Telenutrition is a virtual service that involves education and training, where clients are required to apply self-reporting for a complete Nutrition Care Process (NCP) that includes nutrition assessment, nutrition diagnosis, nutrition intervention, and nutrition evaluation and monitoring[7]. Several trials have proven the effectiveness of telenutrition, particularly in weight management, when compared to face-to-face counseling, driven by the convenience and client motivation related to the former[8-13]. Other studies have also shown promising results in diabetic patients with monitoring blood glucose levels and supporting weight loss[14]. However, communication *via* video calls, e-mails, smartphones, and other types of virtual applications[15] may present several limitations and challenges[16]. One of the main factors that must be considered is the availability of technology and technical errors that occur during sessions. Another factor is the process of self-reporting[17], which is expensive and may introduce false measurements[16]. A previous descriptive cross-sectional survey distributed to 300 dietitians showed that most clients preferred using the phone instead of online platforms, where most difficulties were associated with technical issues and communication, highlighting the need for additional training and tools in telecommunication. Data have also shown that most telenutrition services are directed towards weight loss, with several limitations occurring during consultations, including the absence of anthropometric measurements and interpersonal communication[3].

OBJECTIVE

In the current study, we aimed to assess dietitians' telenutrition experiences in Saud Arabia, focusing on the characteristics of telenutrition delivered, dietitians' perception of telenutrition quality, and associated factors using a validated survey translated into Arabic[3].

MATERIALS AND METHODS

STUDY DESIGN

A cross-sectional study was conducted using a validated survey *via* the Google Survey platform distributed to RDs working in different regions in Saudi Arabia. The survey was distributed to 300 RDs working in the Riyadh, Makkah, or Eastern regions of Saudi Arabia in the past year (2022–2023) through King Abdul Aziz University social networks. 108 (36%) participants responded to the survey (108 out of 300). All participants provided informed consent prior to responding to the survey. RDs who continued to work full-time were recruited for the study. The inclusion criteria included RDs working in Saudi Arabia who had practiced nutrition counseling in the last three years. The exclusion criteria included RDs who had not practiced virtual nutrition consultation in the past three years.

SURVEY DESCRIPTION AND TRANSLATION

A validated survey from a published article was obtained for use in this study[3], which was translated from English to Arabic by a native Arabic speaker who is also fluent in English. Once translated, a bilingual speaker of both Arabic and English back-translated the translated survey into Arabic. Participants' responses were given in Arabic and then translated into English.

The survey comprised 36 questions designed to assess participants' perceptions and challenges of telenutrition *via* phone and/or online platforms. The questions addressed the education and professional characteristics of the RDs; telenutrition characteristics, including setting, clients, and types of referrals; and RDs' perceptions of telenutrition quality. The analysis also explored factors associated with a higher overall

quality score when using the phone or an online platform for counseling, based on multivariable logistic regression. A higher quality score for phone counseling was defined as a total quality score exceeding the median value of seven points, while a higher quality score for online platform counseling was defined as a total quality score exceeding the median value of eight points, for performing telemedicine using the phone. Some items were scored on a ten-point Likert scale ranging from 1 to 10, where 1 = "very low", and 10 = "very high"; whereas others were scored on a four-point Likert scale, where 1 = "very little" and 4 = "high".

DATA ANALYSIS

All statistical analyses were conducted using SPSS version 25 (IBM, New York). The Kolmogorov–Smirnov test was used to determine the normality of continuous variable distributions, which are represented as means, and standard deviations are described in terms of the interquartile range (median) due to continuous data distributions significantly deviating from normal. Categorical variables (e.g., the proportion of participants that responded in a specific way) were characterized using frequency counts and denoted as n (%). The association between the RDs' socio-demographic and occupational factors, and the overall quality of phone and online counseling, was investigated using logistic regression models with stepwise variable selection. Independent variables associated with the overall quality variable were considered for inclusion in the multivariate models at a significance level of $p \leq 0.10$. Two separate models were created, with the median value of the quality score of each type of consultation assigned as the cut-off value. All tests were two-sided, and $p < 0.05$ was considered statistically significant.

RESULTS

EDUCATION AND PROFESSIONAL CHARACTERISTICS OF DIETITIANS

Out of the 300 participants, only 108 (36%) individuals responded to the survey. Table 1 describes the characteristics of the survey participants. The majority of the participants were female, with a mean age range of 25–34 years old. Furthermore, 78 (83.3%) participants held a Bachelor of Science degree, with nutrition being the field of study for all participants. Public hospitals and other work environments were the most common

Table 1. Michel's Classification System.

Characteristics	Result (n = 108)	
	n	%
Age, years		
Mean	2.59	
SD	1.01	
Sex (female)	90	83.3
Highest level of education		
BSc	78	72.2
MS	25	23.1
PhD	5	4.6
Field of highest degree obtained		
Nutrition	108	100
Public Health/Epidemiology	0	0
Business Management/Health Systems Management	0	0
Biology/Biochemistry/Chemistry	0	0
Medical Sciences	0	0
Other	0	0
Employment setting		
Public hospital	45	41.7
Private hospital	16	14.8
Self-owned clinic	11	10.2
Private or chain clinic	18	16.7
Gym/fitness center	4	3.7
Other	22	20.4
Not working	6	5.6
Years of professional experience		
Mean	1.82	
SD	1.21	
Field of expertise in nutrition counselling		
Overweight/obesity/weight loss	21	19.4
CVD	5	4.6
Diabetes	20	18.5
Oncology	1	0.9
Gastrointestinal	19	17.6
Pediatrics (aged <6 years)	18	16.7
Bariatric surgeries	2	1.9
Eating disorders	5	4.6
Sports nutrition	5	4.6
No area of clinical specialization	12	11.1

Table 1. Michel's Classification System–Continued

Number of hours/weeks performing nutrition		
Mean	25.4	
SD	14.3	
Work capacity		
Full time	47	43.5
Part time	40	37.0
Unemployed	21	18.5

BSc, Bachelor of Science; MSc, Master of Science; PhD, Doctor of Philosophy; SD, standard deviation.

employment settings. The average number of years of professional experience was 1.82 ± 1.21. The most popular field of expertise was overweight/obesity/weight loss (*n* = 21; 19.4%), followed by diabetes (*n* = 20; 18.5%), gastrointestinal (*n* = 19; 17.6%), and pediatrics (*n* = 18; 16.7%). The mean number of hours per week spent on nutrition counseling was 25.4 ± 14.3 prior to the COVID-19 pandemic, and 24.5 ± 14.8 following the COVID-19 pandemic, with no statistically significant difference. Finally, following the COVID-19 pandemic, 47 (43.5%) participants had a full-time job capacity, whereas 40 (37.0%) worked part-time.

TELENUTRITION CHARACTERISTICS

Table 2 describes the characteristics of telenutrition provided by the respondents, which include identification of consultation type (face-to-face or phone consultation, or online consultations), client age, and referral type. Mixed counseling was the most common setting, with 40 (37.0%) participants performing face-to-face counseling, phone consultation, and online consultation. In comparison, 23 (21.3%) participants used online counseling only, and 20 (18.5%) met clients in person exclusively. Furthermore, 20 (18.5%) consulted more women, and 19 (17.6%) consulted more men. Moreover, the RDs identified different types of referrals, the majority of which (n = 35; %32.4) were identified as an increase in referrals for weight loss/weight maintenance, whereas 28 (25.9%) reported more referrals for diabetes control, and 23 (21.3%) observed more referrals for eating disorders.

DIETITIANS' PERCEPTION OF TELENUTRITION QUALITY

Table 3 presents data on the RDs' perception of telenutrition quality. Prior to the COVID-19 pandemic,

Table 2. Characteristics of telenutrition provided by dietitians

Characteristics	Result (n = 108)	
	n	%
Setting		
Usual nutrition counselling (face-to-face, in-person)	20	18.5
Usual nutrition counselling and phone nutrition counselling	1	0.9
Only phone nutrition counselling	3	2.8
Usual nutrition counselling and online nutrition counselling	16	14.8
Only online nutrition counselling	23	21.3
Only phone and online nutrition counselling	5	4.6
Usual nutrition counselling as well as phone and online nutrition counselling	40	37.0
Clients		
Younger clients	14	13.0
Older clients	14	13.0
More women	20	18.5
More men	19	17.6
Other	8	7.4
Type of **referrals**		
More referrals for weight loss/ weight maintenance	35	32.4
More referrals for diabetes control	28	25.9
More referrals for pediatric nutrition	12	11.1
More referrals for eating disorders	23	21.3
More referrals for gastrointestinal problems	4	3.7
Other*	6	5.6

Frequency
**Replies for the category "other" included the following: hardly any new clients, just returning referrals, and an overall decrease in referrals.*

the majority (*n* = 68; 63%) of respondents had prior experience providing virtual consultation, whereas 13 (12.0%) had only minimal experience, and five (4.6%) had no prior experience. More than half of the RDs (n = 59; 54.6%) claimed phone and online consultations were like face-to-face consultations, whereas 27 (25.0%) believed the former to be inferior. In contrast,

Table 3. Dietitians' perception of telenutrition quality

	Result (*n* = 108)			
Question/Response	**n**	**%**	**Median**	**Interquartile Range**
Previous experience with telenutrition				
Yes	68	63.0		
Very little	13	12.0		
No	5	4.6		
I learned to use the online platforms during the coronavirus pandemic	22	20.4		
How would you compare telenutrition to face-to-face counseling?				
Superior to face-to-face counselling	8	7.4		
Similar to face-to-face counselling	59	54.6		
Inferior to face-to-face counselling	27	25.0		
Not certain	14	13.0		
Quality of counselling**				
Overall quality*			7.5	6
Technical quality*			8	3
Clinical quality*			7	3
Organizational Difficulties*			7	4
Convenience†			4	1
Future use†			4	1
Types of difficulties reported during counselling				
Technical difficulties	19	17.6		
Interpersonal communication difficulties	16	14.8		
Difficulties due to lack of anthropometric measurements	52	48.1		
Difficulties/inconveniences from conducting the session in the home environment	6	5.6		
Other	8	7.4		
All of theabove	7	6.5		

Frequency
**Items scored on a ten-point Likert scale ranging from 1 to 10, where 1 = "very low" and 10 = "very high".*
†*Items scored on a four-point response scale, where 1 = "very little" and 4 = "high".*

only eight (7.4%) participants claimed phone counseling was superior to face-to-face counseling. Frequent difficulties were reported in using phone and online counseling due to a lack of anthropometric measurements (*n* = 52; 48.1%), followed by technical difficulties (*n* = 19; 17.6%), and interpersonal or communication difficulties (*n* = 16; 14.8%). The fewest obstacles were encountered when conducting the session in the home environment (*n* = 6; 5.6%).

ASSOCIATIONS BETWEEN SOCIO-DEMOGRAPHIC AND OCCUPATIONAL CHARACTERISTICS OF DIETITIANS AND THE OVERALL QUALITY OF TELENUTRITION (BY PHONE AND ONLINE PLATFORMS)

In multivariate logistic regression, with the dependent variable being a total quality score of phone counseling greater than 7, older age was associated with a higher

Table 4. Multivariable logistic regression analysis of factors associated with a higher overall quality score when using the phone for counseling.

(*n* = 30)	OR	95 % CI	*p*-value*
Age (years)	2.717	1.028, 7.187	0.044
Academic degree (MSc and above v. BSc and below)	0.274	0.034, 2.180	0.221
Employment setting (public v. private)	0.957	0.166, 5.512,	0.961
Workload during the pandemic (partial v. full)	1.382	0.264, 7.252	0.702
Previous experience using the phone in dietetic counselling (no experience v. experience)	1.464	0.310, 6.909	0.630
Constant	0.116		0.497

BSc, Bachelor of Science; MSc, Master of Science; CI, confidence interval; OR, odds ratio
**A higher quality score was assigned a total quality score higher than the median value of seven points for performing telemedicine using the phone.*
**p < 0.05 is considered significant.*

Table 5. Multivariable logistic regression analysis of factors associated with a higher overall quality score using an online platform for counseling.

(*n* = 16)	OR	95 % CI	*p*-value*
Age (years)	1.664	0.678, 4.079	0.266
Academic degree (MSc and above vs. BSc and below)	349498895.7	0.000	0.999
Employment setting (public vs. private)	0.863	0.103, 7223	0.892
Workload during the pandemic (part-time vs. full-time)	3.195	0.431, 23.677	0.256
Previous experience using the phone in dietetic counselling (no experience vs.experience)	0.000	0.000	0.998
Constant	80639753.9		0.999

BSc, Bachelor of Science; MSc, Master of Science; CI, confidence interval; OR, odds ratio
**A higher quality score was assigned a total quality score higher than the median value of eight points for performing telemedicine using the phone*
**p < 0.05 is considered significant.*

quality score (OR = 2.717; 95% CI = 1.028, 7.187; p = 0044) (Table 4). There was no significant association between socio-demographic and occupational characteristics of dietitians, and the overall quality of telenutrition using online platforms (Table 5).

DISCUSSION

The COVID-19 pandemic prompted a rapid and sudden change, from traditional face-to-face consultations to the use of virtual consultations, in both primary and secondary care[18]. However, the extent to which RDs participated, as well as the overall quality of these consultations, remains unknown. In the current study, we presented the unique characteristics of telenutrition in Saudi Arabia. Our results were similar to those published by Kaufman-Shriqui et al. in 2021, where most of the participants had experience providing virtual nutrition counseling, with the majority specializing in overweight/obesity and diabetes[3]. Although obesity and overweight are global health issues, tackling them virtually has become more popular because of the COVID-19 pandemic. A study carried out in 2020 examined the impact of videoconferencing on weight loss; the approach enabled clients living in rural areas to access the program, leading to increased engagement and peer support[19].

Telenutrition can be delivered *via* several channels, such as phone calls, online messaging platforms, and video calls. Table 2 presents the characteristics of the telenutrition delivered by the Saudi RDs, where most RDs frequently performed mixed counseling, which included both face-to-face nutrition counseling, phone consultation, and online consultation. The participants reported an increase in weight loss/weight maintenance referrals, which is unsurprising, given that obesity has emerged as a risk factor for COVID-19-related morbidity and mortality[20] and is still considered a major diet-related issue in Saudi Arabia[21]. Although our results agreed with those of Kaufman-Shriqui et al. in 2021, our RDs reported higher numbers of older clients who

participated in online counseling. In addition, the older age group was the only significant predictor of a higher phone counseling quality score. One of the main reasons for this effect may be that the elderly rely on the convenience, cost-effectiveness, and accessibility of receiving health care services from their home [22]. However, the use of technology can be challenging, and several technical errors may occur. Table 3 presents an evaluation of the overall quality of phone and online consultations, which showed a relatively high score. Nevertheless, 59% of the participants claimed that virtual consultations were similar to face-to-face counseling in terms of quality, and meeting the outcomes and goals of the consultations. However, in a study by Kaufman-Shriqui, 65.4% of participants indicated that phone consultations were inferior to face-to-face counseling. This result may be due to differences in culture and how online consultations are perceived, including difficulties faced by clients during consultations. In previous studies, one of the major obstacles that patients faced was a lack of interest in accessing the internet for consultations, whereas RDs were challenged by the inability to complete the NCP, as evaluation and monitoring were difficult to carry out[23]. Indeed, monitoring is an essential aspect of telenutrition, as it supports clients' health by enhancing compliance with diet plans and motivates them to continue participating in remote weight-loss programs[24].

The most frequently reported difficulties for both phone and online platforms identified by RDs in the present study were a lack of anthropometric measures, technological difficulties, and interpersonal communication difficulties. These results support our hypothesis that knowledge acquisition, along with training, technical skills, and multitasking, are the most significant considerations for the effective implementation of telenutrition. As stated in the introduction, there has been very little research on telenutrition in Saudi Arabia, with our study being the first to examine telenutrition practices in the country. In agreement with our results, the use of telenutrition has increased after the COVID-19 pandemic among Arab countries using social media, with time constraints being the main barrier, yet clients have shown great interest in several areas, such as healthy eating habits, healthy recipes, nutrition and immunity, and medical nutrition therapy[5].

When comparing our results to those of Kaufman-Shriqui et al. in 2021, there were similarities in both the difficulties dietitians encountered and the relatively high overall quality rating of telenutrition. However, there were some differences. For example, dietitians had no previous experience prior to the pandemic, and due to the pandemic, there was a reduced workload, as most participants only began using virtual consultations after the COVID-19 outbreak. In contrast, in other studies, virtual consultation was initiated before the pandemic.

The use of virtual consultation has the potential to be beneficial for both patients and practitioners. Studies have shown that the ability of service users and their caregivers to consult with general practitioners digitally/online enhances access to health care for certain populations, such as the elderly, women, and employed participants[25]. Individuals are also able to express themselves more openly about health concerns *via* telenutrition[26], in addition to other benefits, such as the ability to share images, as RDs may request to see the patient's kitchen, food items, serving dishes, and medications and/or supplementations. Although a growing number of studies have demonstrated the advantages of online appointments, there are concerns that they may involve some risk clinically, and/or are less acceptable to patients or staff. Moreover, there are considerable technological, logistical, and regulatory problems, in addition to the lack of physical examinations, that prevent online appointments from fully replacing face-to-face counseling[22,27]. To improve the success of virtual nutrition care consultations, the use of telemonitoring has been suggested[28], which involves patient self-reporting and weekly follow-ups using electronic scales, blood pressure analyzers, continuous glucose monitoring, and other health-related assessment tools[14]. Although guidelines on self-reporting have been published recently regarding e-scaling and nutrition assessment (e.g., 24-hour recall), errors may still occur, as ensuring the accuracy and precision of measurements *via* self-reporting can be challenging[29].

The findings of this study can be used as a platform for future research on both dietitians' and clients' perceptions of the usage of telenutrition in Saudi Arabia and highlight how further tools are needed to improve the experience. One of the main targets is

patients who are unable to reach clinics physically due to geographical barriers, such as distance, especially in remote rural areas. The National Health Service in the UK has also evaluated digital consultation for weight management in terms of acceptability and effectiveness, with the added benefit of convenience that is not found with face-to-face consultations, and the main challenge being the influence of practitioner attributes, which plays a major role in patient's or client's commitment to treatment[30].

CONCLUSION

The current work is considered a preliminary study that examines dietitians' perception of the quality of telenutrition delivered in Saudi Arabia. The findings showed high scores related to telenutrition quality among adults and the elderly, specifically in weight loss and weight management referrals. Our study also showed that convenience was considered a crucial benefit of telenutrition, despite the technical errors encountered by the participants. In addition to the inability to provide a complete NCP due to incomplete nutrition assessment, based on our results, we suggest improving telenutrition *via* client self-reporting and telemonitoring to obtain essential measurements and cover the entirety of the NCP. Moreover, such practices may also empower the community, motivating them to lose weight *via* measurement tools and providing training to ensure the delivery of effective dietary programs. As the effectiveness of telenutrition remains largely unknown, future studies must be designed to explore this issue further.

ACKNOWLEDGMENTS

The authors would like to thank all dietitians from various regions of Saudi Arabia, including Riyadh, Makkah, and the Eastern provinces, who participated in the study. Additionally, the authors sincerely appreciate the technical and financial support provided by the Institutional Fund Projects from the Ministry of Education and King Abdul Aziz University in Jeddah, Saudi Arabia.

AUTHOR CONTRIBUTION

Noura M.S. Eid contributed to the conceptualization, methodology, writing of the original draft, review and editing, and supervision of the project. Amal Shibli, Dalia Shibli, and Raghad Alsulami were involved in validation, formal analysis, investigation, and writing the original draft. Sumia Enani handled formal analysis, data curation, and contributed to the writing of the original draft and supervision. Rana H. Mosli participated in validation, supervision, and the review and editing process.

CONFLICTS OF INTEREST

The authors have no conflicts of interest to declare. All co-authors have seen and agreed with the manuscript's contents, and there is no financial interest to report. We certify that the submission is an original work and is not under review at any other publication.

DISCLOSURE

This research is funded by the Institutional Fund Projects under grant no. IFPRC-206-141-2020.

ETHICAL APPROVAL

Ethical approval to conduct this study was obtained from the Applied Medical Sciences research committee (Reference Letter No. FAMS-EC2022-04). A brief online description of the study and consent forms were sent to the prospective participants through their social networks.

REFERENCES CITED

[1] Gehring JN, Hales SB, Kruis R, Simpson K, Langston L, and McElligott J. Examining Utilization of an Outpatient Telenutrition Service Across Primary Care Clinics in South Carolina. Telemed J E Health 2023;30(4):pp.e1081-e1088., doi:10.1089/tmj.2023.0330.

[2] Vimalananda VG, Gupte G, Seraj SM, Orlander J, Berlowitz D, Fincke BG, and Simon SR. Electronic consultations (e-consults) to improve access to specialty care: a systematic review and narrative synthesis. Journal of telemedicine and telecare 2015;21(6):323-330.

[3] Kaufman-Shriqui V, Sherf-Dagan S, Boaz M, and Birk R. Virtual nutrition consultation: what can we learn from the COVID-19 pandemic? Public Health Nutrition 2021;24(5):1166-1173, doi:10.1017/S1368980021000148.

[4] Van KM, Beauchamp DM, Rachid RD, Man H, Mansour RD, Man M, Buckley RD, Man B, Choi DD, Prescod A, and Monk JM. Impact of the COVID-19-induced shift to online dietetics training on PDEP competency acquisition and mental health. Can J Diet Pract Res 2022;83(3):144-146, doi:10.3148/cjdpr-2022-002.

[5] Bookari K, Arrish J, Alkhalaf MM, Alharbi MH, Zaher S, Alotaibi HM, Tayyem R, Al-Awwad N, Qasrawi R, Allehdan S, Al Sabbah H, AlMajed S, Al Hinai E, Kamel I, Ati JE, Harb Z, and Hoteit M. Perspectives and practices of dietitians with

regards to social/mass media use during the transitions from face-to-face to telenutrition in the time of COVID-19: A cross-sectional survey in 10 Arab countries. Front Public Health 2023;11(1151648, doi:10.3389/fpubh.2023.1151648.

[6] Peregrin T. Telehealth is transforming health care: what you need to know to practice telenutrition. J Acad Nutr Diet 2019;119(11):1916-1920.

[7] Flodgren G, Rachas A, Farmer AJ, Inzitari M, and Shepperd S. Interactive telemedicine: effects on professional practice and health care outcomes. Cochrane Database Syst Rev 2015;2015(9):Cd002098, doi:10.1002/14651858.CD002098.pub2.

[8] Kuzmar IE, Cortés-Castell E, and Rizo M. Effectiveness of telenutrition in a women's weight loss program. PeerJ. 2015 Feb 3;3:e748.

[9] Liñan CC, Mayorga JHA, and Lozada-Urbano M. The effects of telenutrition in overweight and obese adults in a nutritional center in Lima, Peru. F1000Research 2021;10.

[10] Ventura Marra M, Lilly CL, Nelson KR, Woofter DR, and Malone J. A pilot randomized controlled trial of a telenutrition weight loss intervention in middle-aged and older men with multiple risk factors for cardiovascular disease. Nutrients 2019;11(2):229.

[11] Wood S, Khong CM, Dirlikov B, and Shem K. Nutrition counseling and monitoring via tele-nutrition for healthy diet for people with spinal cord injury: A case series analyses. The journal of spinal cord medicine 2022;45(4):547-555.

[12] Misirli E, Cebioğlu IK. Investigating the Weight Loss Success of Clients Participated in Different Telenutrition Intervention Groups: A Cross-Sectional Design. Turkiye Klinikleri Journal of Health Sciences. 2022 Jul 1;7(3).

[13] Döbler A, Herbeck Belnap B, Pollmann H, Farin E, Raspe H, and Mittag O. Telephone-delivered lifestyle support with action planning and motivational interviewing techniques to improve rehabilitation outcomes. Rehabilitation psychology 2018;63(2):170.

[14] Al-Ofi EA, Mosli HH, Ghamri KA, and Ghazali SM. Management of postprandial hyperglycaemia and weight gain in women with gestational diabetes mellitus using a novel telemonitoring system. Journal of International Medical Research 2019;47(2):754-764.

[15] Practicing telehealth. Definition of terms list. 2019. Available from: https://www. eatrightpro.org/practice/practice-resources/ telehealth/practicing-telehealth.

[16] Gnagnarella P, Ferro Y, Monge T, Troiano E, Montalcini T, Pujia A, and Mazza E. Telenutrition: Changes in professional practice and in the nutritional assessments of Italian dietitian nutritionists in the COVID-19 era. Nutrients 2022;14(7):1359.

[17] Hearps SJ. Self-reported anthropometric data. Can J Public Health 2010;101(4):345; author reply 345, doi:10.1007/bf03405301.

[18] Murthy V, Herbert C, Bains D, Escudier M, Carey B, and Ormond M. Patient experience of virtual consultations in Oral Medicine during the COVID-19 pandemic. Oral diseases 2022;28(2400-2405.

[19] Cliffe M, Di Battista E, and Bishop S. Can you see me? Participant experience of accessing a weight management programme via group videoconference to overcome barriers to engagement. Health Expectations 2021;24(1):66-76.

[20] Rao X, Wu C, Wang S, Tong S, Wang G, Wu G, and Zhou R. The importance of overweight in COVID-19: a retrospective analysis in a single center of Wuhan, China. Medicine 2020;99(43):e22766.

[21] Salem V, AlHusseini N, Abdul Razack HI, Naoum A, Sims OT, and Alqahtani SA. Prevalence, risk factors, and interventions for obesity in Saudi Arabia: A systematic review. Obes Rev 2022;23(7):e13448, doi:10.1111/obr.13448.

[22] Greenhalgh T, Vijayaraghavan S, Wherton J, Shaw S, Byrne E, Campbell-Richards D, Bhattacharya D, Hanson P, Ramoutar S, and Gutteridge C. Virtual online consultations: advantages and limitations (VOCAL) study. BMJ open 2016;6(1):e009388.

[23] Gnagnarella P, Ferro Y, Monge T, Troiano E, Montalcini T, Pujia A, and Mazza E. Telenutrition: Changes in Professional Practice and in the Nutritional Assessments of Italian Dietitian Nutritionists in the COVID-19 Era. Nutrients 2022;14(7), doi:10.3390/nu14071359.

[24] Turnin MC, Gourdy P, Martini J, Buisson JC, Chauchard MC, Delaunay J, Schirr-Bonnans S, Taoui S, Poncet MF, Cosma V, Lablanche S, Coustols-Valat M, Chaillous L, Thivolet C, Sanz C, Penfornis A, Lepage B, Colineaux H, Mounié M, Costa N, Molinier L, and Hanaire H. Impact of a Remote Monitoring Programme Including Lifestyle Education Software in Type 2 Diabetes: Results of the Educ@dom Randomised Multicentre Study. Diabetes Ther 2021;12(7):2059-2075, doi:10.1007/s13300-021-01095-x.

[25] Hammersley V, Donaghy E, Parker R, McNeilly H, Atherton H, Bikker A, Campbell J, and McKinstry B. Comparing the content and quality of video, telephone, and face-to-face consultations: a non-randomised, quasi-experimental, exploratory study in UK primary care. British Journal of General Practice 2019;69(686):e595-e604.26. Zanaboni P, and Fagerlund AJ. Patients' use and experiences with e-consultation and other digital health services with their general practitioner in Norway: results from an online survey. BMJ open 2020;10(6):e034773.

[26] Fagerlund AJ, Holm IM, and Zanaboni P. General practitioners' perceptions towards the use of digital health services for citizens in primary care: a qualitative interview study. BMJ open 2019;9(5):e028251.

[27] Street J, and Ricks M. What are the medicolegal implications of virtual clinics? British Journal of Hospital Medicine 2021;82(9):1-6.

[28] Meystre S. The current state of telemonitoring: a comment on the literature. Telemedicine Journal & e-Health 2005;11(1):63-69.

[29] Krukowski RA, and Ross KM. Measuring weight with electronic scales in clinical and research settings during the coronavirus disease 2019 pandemic. Obesity (Silver Spring, Md.) 2020;28(7):1182.

[30] Nicholls W, Lloyd J, Shepherd K, McArdle P, Tellwright, H and Devonport TJ. Digital consultations for weight management in the NHS: A qualitative evaluation. Obesity Research & Clinical Practice 2023;17(2):158-165.