STUDY PROTOCOL

# The Feasibility and Effectiveness of Telenutrition for Remote Dietary Consultation: A Systematic Review and Meta-analysis Protocol

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**ABSTRACT**

**Aims and Design:** Telenutrition offers a potentially useful health improvement approach by providing patients with remote online dietary counselling and disease management services. This review protocol will examine how feasible and effective providing online dietary consultation could be through telenutrition. **Data Sources:** Adhering to the PRISMA-P, articles from the Cochrane Library, PubMed, Google Scholar, EBSCo, and Scopus databases will be searched using PICOS (population, intervention, comparator, outcome, and study design). **Review Methods:** The inclusion criteria will be an RCT study design and intervention involving telehealth and telenutrition services, published in English between 1997 and 2022 and in full-text form. The overall risk of bias will be assessed using the Risk of Bias tool developed by the Cochrane Collaboration and the RevMan 5.0 computer program. The latter will be utilised to conduct a meta-analysis. The chosen studies' heterogeneity will be assessed using a random-effects model and the I2 statistic. Each intervention's efficacy will be indicated through the statistical significance of the between-group difference (p-value <0.05). The quality of the methodology will be assessed by measuring the RCT design using the Jadad scale, while the evidence quality will be determined using the GRADE system. **Results:** This review protocol will summarise evidence regarding the feasibility and effectiveness of employing telenutrition for remote dietary consultation. Conference presentations and peer-reviewed journal publications will be how the findings are disseminated. **Conclusion and impact:** The findings may help to guide the effective implementation of remote dietary consultation services for patients. Trial Registration No: CRD42022340706
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**Keywords:** Diet consultation; Protocol; Systematic review; Telehealth; Telenutrition

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## INTRODUCTION

According to the World Health Organization (WHO), telehealth is the remote delivery of health services to synchronously and/or asynchronously exchange health information using information and communication technologies. Examples include telephone and video conference consultations, text messaging, and web portals (1). In Malaysia, telehealth was first introduced in July 1997 with the establishment of the Telemedicine Blueprint. The objectives of telehealth are to strengthen healthcare delivery via the use of information, telecommunications, and multimedia technologies. Telehealth can be utilised as a more virtual, distributed, and integrated tool to reinforce the healthcare delivery system to achieve better healthcare delivery and efficiency (2).

The utilisation of telehealth technology is expanding across the healthcare industry. Many organisations and patients are becoming more accepting of telehealth technology, such as mobile applications, health education services, and remote patient monitoring equipment, technological applications already employed by healthcare organisations (3). The Pan American Health Organization states that digital health, particularly telemedicine visits, electronic records, and electronic prescriptions have proven advantageous during health service disruptions. They effectively ensure continuity of care and, monitor and evaluate interventions for non-communicable diseases (NCDs) (4). In the current global COVID-19 context, the pandemic has led to expansion or even

initiation of telehealth services. Thus, telehealth has adapted to mitigate the issue of numerous patients lacking access to care and, secondly, due to the physical and social distancing requirements during the pandemic. During the COVID-19 pandemic, telehealth services would ensure patient safety through a safe and effective treatment modality (3).

"The Academy of Nutrition and Dietetics defined telenutrition as the interactive use by a registered dietitian nutritionist (RDN) of electronic information and telecommunications technologies to implement the Nutrition Care Process (NCP) with patients or clients at a remote location, within the provisions of the RDN's state license as applicable" (5 p. 235).

Meanwhile, the widespread acceptance of virtual healthcare services among patients and healthcare providers creates new opportunities for dietitians and nutritionists to provide telenutrition care (6). In NCD patients' studies, telephone-delivered nutrition consultations were more cost-effective than usual care (7). The interventions were provided to various patients, including those with hypertension, chronic kidney disease, and diabetes and those undertaking cardiac rehabilitation. Telehealth offers access to resources and care for patients in rural areas or areas with provider shortages. In addition, telehealth will improve efficiency without incurring higher net costs, minimise patient travel and wait times, and improve care quality (6). It would provide an alternative solution to delivering dietary counselling during worldwide crises, such as the spread of COVID-19, which has made social distancing mandatory.

This review protocol aims to gather evidence on the feasibility and effectiveness of telenutrition intervention by dietitians or nutritionists to deliver dietary interventions. This proposed review protocol determines the feasibility and effectiveness of telenutrition intervention compared to usual or traditional care.

## METHODS AND DESIGN

### Study Design

This systematic review protocol adheres to the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) statement and is registered with PROSPERO (CRD42022340706) (8). There are 17 items checklist considered essential components of systematic review and meta-analysis included in the PRISMA-P. Any systematic review is recommended to include the participants, interventions, comparisons, outcome(s), and study design (PICOS) reporting system (8).

### Search Method

A combination of keyword and Medical Subject Headings (MeSH) terms related to telenutrition and online nutrition management will be used. Terms such as "telehealth", "telenutrition", "telecounselling", "telediet", "online dietetic care", "online nutrition", and "remote monitoring", together with "nutrition management", "nutrition care", "medical nutrition therapy", and "clinical nutrition", will be used to explore the literature. The Boolean operators 'OR' and 'AND' will be used to connect similar searches to combine key search terms, as defined in the search strategy. The search will encompass several databases, including Scopus, PubMed, Cochrane Library, Google Scholar, and EBSCo.

### Inclusion and Exclusion Criteria

*Participants*

Participants at any stage of life (excluding the paediatric population and pregnant women) who received telenutrition or remote monitoring services from dietitians or nutritionists will be evaluated.

*Intervention(s)*

All studies involving the interactive use of electronic and telecommunication technologies by dietitians or nutritionists to implement the NCP (nutrition assessment, nutrition diagnosis, nutrition intervention, and nutrition monitoring and evaluation) for patients in remote locations will be reviewed. This intervention will include telehealth models only when dietitians or nutritionists interact directly with patients using a telehealth modality. Activities include the use of real-time videoconferencing or remote monitoring applications involving synchronous or asynchronous interaction. Interventions focusing specifically and only on static/non-interactive websites or non-interactive games, as well as mobile health (mHealth) apps, will be excluded.

*Comparison*

The study will compare telenutrition with usual or traditional care (face-to-face). Traditional care focuses on nutrition management using standardised assessments and treatment.

*Outcomes*

The primary outcomes of interest will be the feasibility and effectiveness of telenutrition services intervention, as determined by the review's inclusion and exclusion criteria. The feasibility outcome will include the participants' adherence, retention rates, perceptions, and satisfaction regarding the telehealth or telenutrition services intervention. Meanwhile, the effectiveness outcome measures will be assessed using the biomedical data related to the physiological (e.g., blood pressure, glycosylated haemoglobin (HbA1c), total cholesterol (TC), and triglyceride (TG), and physical conditions (e.g., waist circumferences (WC) and body mass index (BMI)) of the traditional care group and the telenutrition intervention group.

*Study Design*
Only randomised controlled trials will be included in the systematic review. Studies comparing telenutrition interventions to usual care (otherwise known as standard or traditional care) will be included. Cross-sectional studies, case series, case reports, reviews, meta-analyses, and animal experiments will be excluded.

*Settings*
The inclusion criteria for the intervention group setting will be online healthcare delivery at a patient's home, office, or any other appropriate place. Meanwhile, face-to-face counselling at healthcare facilities like hospitals and clinics will be included for the control group.

*Publication date*
The study will include studies published between 1997 and 2022.

*Language*
This review will be restricted to studies published in English.

*Others*
Only publications available as full-text articles will be reviewed.

**Study Selection**
The study selection will adhere to the PRISMA flowchart, which comprises three stages: screening, identification, and inclusion (9, 10). Firstly, any duplicate records will be identified and removed using the Mendeley referencing software. Then, three researchers will conduct title, abstract, and full-text screening to identify publications that meet the inclusion and exclusion criteria. Any reasons for excluding ineligible studies will be recorded at the screening stage. PDF copies of the reviewed articles will be stored in Google Drive. Further discussions will be conducted between the researchers to reach an agreement, and any differences regarding the findings will be resolved during screening.

**Data Extraction and Management**
The data collected from the systematic searches will be extracted into Microsoft Excel, and the references will be retained in the Mendeley referencing software. Data extraction will be documented in a table containing the titles, author(s), publication years, geographic origin, study designs, population characteristics (sample, age, gender, ethnicity, and the country where each intervention was conducted), effect sizes, and outcomes. The feasibility outcomes will measure the participant recruitment rates, retention rates, attendance/adherence to the programs, completion rates, and satisfaction during the implementation, whereas the effectiveness outcomes will measure the participants' physiological and physical conditions such as HbA1c, TC, TG, BP, BMI, and WC.

**Risk of Bias Assessment**
The Risk of Bias tool developed by the Cochrane Collaboration and RevMan 5.0 software will be used to assess the risk of bias in each article (11, 12). The articles will be assessed regarding the randomisation process, deviations from intended interventions, missing outcome data, outcome measurement, selection of the reported results, and overall biases. The risk of bias criteria is 'low risk', 'high risk', and 'some concerns'. Three researchers will independently assess the quality of the selected papers. Funnel plots produced using RevMan 5.0 software will be used to evaluate the possibility of publication bias in each study (12).

**Quality of Evidence Assessment**
Modified Jadad scoring will be used to determine the quality of each included study. On the Jadad scale, scores of 0–4 are considered "poor", scores of 5–8 are "fair", and scores of 9–12 are "good". The scale is based on three criteria: randomisation, double-blinding, and a description of withdrawals and dropouts (13).

The Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) system will be used to assess the strength of the evidence. The researchers will interpret the overall quality of the evidence for each outcome using a four-point ranked scale: 4 = high; 3 = moderate; 2 = low; and 1 = very low (14).

**Data Analyses**
*Descriptive Analysis*
The findings of this review protocol will contain the current evidence regarding the feasibility and effectiveness of telenutrition for remote dietary intervention by dietitians or nutritionists. A qualitative synthesis of the outcomes of the selected studies will be undertaken using thematic analysis to identify the feasibility and effectiveness of telenutrition intervention (15).

This review protocol will extract the following data:
- The telenutrition intervention and control groups
- Characteristics of the populations involved: age, sex, ethnicity, location, nutrition management, and type of telenutrition services.
- Biochemical measures, physical condition baseline, and final measurement between the intervention and control groups.
- Intervention outcomes: feasibility will be determined by the recruitment rate, retention rate, attendance/adherence to the program, completion rate, and satisfaction during each implementation. Meanwhile, effectiveness will be determined by the changes in biomedical measures for physiological (e.g., blood pressure, glycosylated haemoglobin, total

cholesterol, and triglycerides) and physical conditions (e.g., WC and BMI) based on each follow-up timeline of the telenutrition intervention and traditional care groups.

**Statistical Analysis**

A meta-analysis will be conducted using RevMan 5.0 software, whereby the fixed effects model and I2 statistic will be used to assess heterogeneity (12). The risk ratio (RR) will be used for dichotomous outcomes, and mean difference or standardised mean difference will be used for continuous outcomes. A statistically significant between-group difference (p-value <0.05) will be used to indicate the effectiveness of an intervention. If the studies are generally homogenous, a fixed-effect model will be used. All effect estimates will be expressed using 95% confidence intervals (16-18). Outcomes such as the biomedical measures for physiological (e.g., blood pressure, glycosylated haemoglobin, total cholesterol, and triglycerides) and physical conditions (e.g., WC and BMI) will be used to compare telenutrition intervention and traditional care to determine the effectiveness of telenutrition.

Funnel plots will be used to determine the publication bias of systematic differences between reported and unreported findings. The p-values associated with each included study will determine the funnel plot symmetry, indicating any publication bias (19). In addition, the researchers intend to perform more in-depth comparisons of certain subgroups and subsets with similar characteristics if such subgroups are available.

The participant baseline characteristics for each RCT population group, such as the biochemical data, physical measurement, and recruitment methods, may influence the results. Moreover, the follow-ups described in each study may use different timelines, such as two weeks, three months, six months, or twelve months. Therefore, the results must consider the participant recruitment context, study quality (i.e., follow-up timelines), and sample sizes.

**Ethics and dissemination**

This review protocol requires no ethics approval. This study will not involve patient privacy or confidential data. The findings will be disseminated through publication in a specialist peer-reviewed journal and/or conference presentation.

## RESULTS

The results of this review will be presented systematically using a PRISMA-P flow diagram (Fig. 1) (9). The findings are expected to deliver a treatment effect estimation regarding the feasibility and effectiveness of using telenutrition to deliver remote dietary counselling for patients. A qualitative synthesis

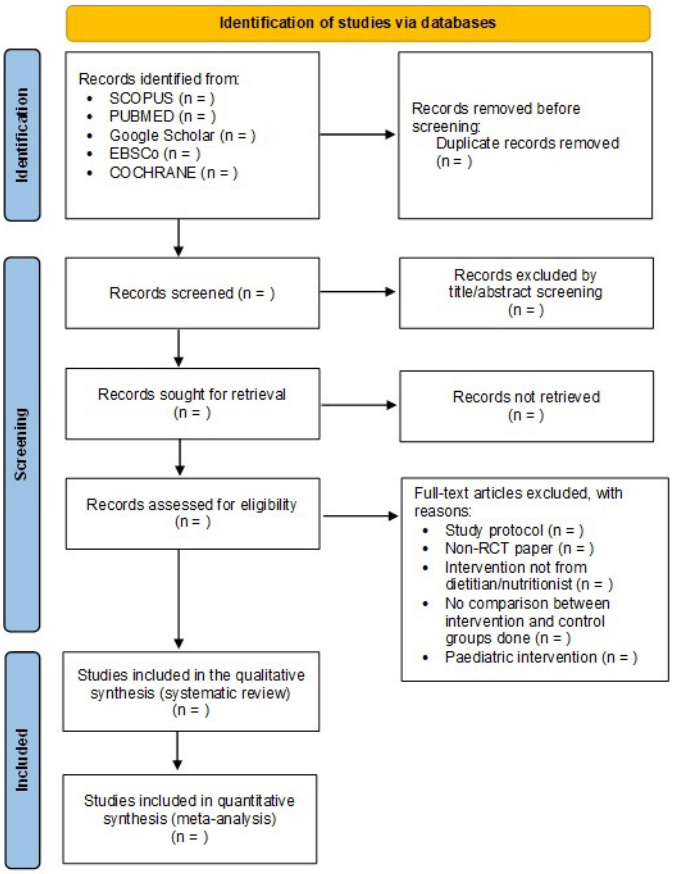


**Figure 1 : PRISMA flow diagram.** The diagram depicts the flow of information through different phases of a systematic review (9).

of the outcomes from the selected studies will be undertaken using thematic analysis to identify the feasibility and effectiveness of telenutrition intervention. The studies will also be pooled via a statistical meta-analysis and supplemented with narrative comparisons when necessary.

The systematic review and meta-analysis findings will be disseminated through conference presentations and/or publication in a peer-reviewed journal.

## DISCUSSION

The increased implementation of telenutrition, particularly during the COVID-19 pandemic, demonstrates that it may be an alternative to traditional face-to-face visits (20). Evidence suggests that using telehealth, dietitians may improve nutrition care and patient outcomes across the NCP domains (21). This systematic review will identify the feasibility and effectiveness of telenutrition services in delivering nutrition care, following the PRISMA-P guideline presented in the PRISMA flow diagram (Fig. 1). The flow diagram mapped the three different phases of a systematic review and meta-analysis. The identification phases will identify records from five databases: SCOPUS, PUBMED, Google Scholar,

EBSCo, and COCHRANE. Duplicated records will be removed before the screening phase. The next phase involved record screening, records sought for retrieval, and records for assessed eligibility which will exclude articles regarding study protocol, non-RCT paper, intervention not from dietitian/nutritionist, no comparison between intervention and control groups, and involved paediatrics. The final phase will include qualitative synthesis (systematic review) and quantitative synthesis (meta-analysis) studies.

This systematic review will comprise a meta-analysis where the outcome would provide a more precise estimate of the treatment effect. In addition, the planned review will utilise a rigorous and innovative tool developed by the Cochrane Collaboration to assess the risk of bias in the included studies. This review protocol will only include studies published between 1997 and 2022 according to the establishment date of Malaysia's Telemedicine Blueprint in July 1997, which may result in a bias for not including earlier studies.

## CONCLUSION

This review protocol may serve as a guide for other researchers conducting systematic reviews of telenutrition services. Thus, this review protocol will help identify the extent to which associated variables can be used to produce an improved systematic review design, recommend the characteristics of associated target populations, and provide elements for intervention. To the best of the authors' knowledge, this systematic review and meta-analysis will be the first study to comprehensively identify the feasibility and effectiveness of using telenutrition services in delivering nutrition care. This study will summarise the latest evidence related to the feasibility and effectiveness of telenutrition, especially during the pandemic, and potentially serve as a guide to implementing practical and useful remote dietary consultation services. To sum up, it would provide an alternative solution to delivering dietary counselling during worldwide crises, such as the spread of COVID-19, which has made social distancing mandatory.

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