Received: 6 April 2023 | Accepted: 26 May 2023

DOI: 10.1111/jhn.13193

CLINICAL PRACTICE

JHND Journal of Human Nutrition and Dietetics | BDA The Association of UK Dietitians

Developing a telehealth medical nutrition therapy (MNT) service for adults living in rural Australia at risk of cardiovascular disease: An intervention development study

Jaimee Herbert[1,2,3] | **Tracy Schumacher**[2,3] | **Leanne J. Brown**[2,3] | **Clare E. Collins**[1,3]

[1]School of Health Sciences (Nutrition and Dietetics), University of Newcastle, Callaghan, NSW, Australia

[2]Department of Rural Health, University of Newcastle, North Tamworth, NSW, Australia

[3]Food and Nutrition Research Program, Hunter Medical Research Institute, Callaghan, NSW, Australia

Correspondence

Clare E. Collins, School of Health Sciences (Nutrition and Dietetics), University of Newcastle, ATC 310, ATC Bldg, University Dr, Callaghan, NSW 2308, Australia.
Email: clare.collins@newcastle.edu.au

Funding information

Medical Research Futures Fund, Grant/Award Number: APP1200481; National Health and Medical Research Council of Australia, Grant/Award Number: APP2009340

Abstract

Background: Receiving medical nutrition therapy (MNT) from an accredited practising dietitian (APD) can reduce diet-related cardiovascular disease (CVD) risk factors. However, people living in rural areas of Australia experience barriers to accessing dietitians because of their remote location. Telehealth has the potential to improve dietetic access in rural areas; however, there is limited research into the development and delivery of telehealth MNT interventions specific to these areas. The present study describes the development of the Healthy Rural Hearts (HealthyRHearts) telehealth MNT intervention, which was developed as a part of the HealthyRHearts randomised control trial, set in primary care practices in rural areas of the Hunter New England and Central Coast Primary Health Network. The aim of HealthyRHearts is to improve diet-related risk factors for CVD in rural adults at moderate to high CVD risk using a telehealth MNT intervention delivered by an APD.

Methods: The study describes the development of the HealthyRHearts telehealth MNT intervention, using the 14-item GUIDance for rEporting of intervention Development (GUIDED) checklist and the Template for Intervention Description and Replication (TIDieR) framework to guide description.

Results: HealthyRHearts is a complex intervention that aims to translate a telehealth MNT intervention for CVD prevention into rural and remote primary care settings. The intervention is designed to be implemented across multiple sites of varying characteristics and needs, with the ability to accommodate individual complexities within the rural context and target population. Participants are adults aged 45–75 years who are assessed as moderate to high risk of CVD by their general practitioner (GP). Consenting participants are referred to the intervention by their GPs and receive five telehealth MNT consultations with an APD over 6-months. APDs are trained in the intervention protocol including intervention materials, resources and behaviour change counselling strategies.

Conclusion: Using the GUIDED and TIDieR frameworks to guide description of the HealthyRHearts intervention development process facilitates detailed description of decision-making pathways for each element of the intervention design. The comprehensive description of the intervention development

process for HealthyRHearts is intended to facilitate replication, iteration and optimisation of the intervention for rural contexts.

KEYWORDS

cardiovascular, intervention development, nutrition, prevention, rural

Key points

- Medical nutrition therapy (MNT) delivered by dietitians to address cardiovascular risk factors is effective and recommended in clinical guidelines.
- Limited studies have described the development and delivery of MNT interventions within primary care to address needs of rural communities.
- Comprehensively describing the development of the HealthyRHearts Medical Nutrition Therapy intervention will facilitate replication, iteration and optimisation of the intervention for rural primary care contexts.

INTRODUCTION

Cardiovascular diseases (CVD) are a group of chronic conditions that effect heart and blood vessels including coronary heart disease, stroke and heart failure.[1] In Australia, CVD accounts for 13% of total disease burden, ranking third behind cancer (17%) and musculoskeletal conditions (15%).[1] Geographical remoteness impacts CVD burden, which is 1.9 times higher in remote and very remote areas compared to major cities (37.9 and 20.2 disability adjusted life years per 1000 population) and, in 2018, Australian rural communities experienced a 30% higher rate of hospitalisation and a 40% higher CVD death rate than their metropolitan counterparts.[2–4]

Diet-related CVD risk factors, including poor diet, hyperlipidaemia, obesity and high blood pressure, are the leading risk factors contributing to CVD burden in Australia.[1] Receiving medical nutrition therapy (MNT) from an accredited practising dietitian (APD) can improve dietary intake, with MNT recommended in clinical guidelines for CVD prevention and management.[5,6] However, rural Australians have lesser access to APDs, with an estimated 20% of the dietetic workforce (approximately 1200 of 7000) working in rural and remote regions despite 28% of the population living in these areas.[7–10] This can result in lengthy waiting lists, long travel times to access public dietitians or a potential high cost of private dietetic consultations.[7–9]

Telehealth is a model of service that could help improve access to MNT for CVD prevention and treatment in rural areas.[11] Uptake of telehealth across Australia has accelerated, especially since the COVID-19 pandemic began in 2020, and with it the introduction of physical distancing rules and the COVID-19 Temporary Medicare Benefits Scheme (MBS) Telehealth Services.[12–14] Evidence indicates that telehealth dietary interventions can be effective in improving diet-related CVD risk factors, including diet quality, weight/body mass index, blood cholesterol and blood pressure levels.[15] However, studies investigating telehealth dietary interventions for CVD are heterogenous in terms of study design, with inconsistent reporting of methods, making replicability difficult.[15–17] Additionally, limited interventions have been set in rural locations, making it difficult to ascertain whether telehealth is an acceptable model for dietary interventions in this context.[10]

Healthy Rural Hearts, abbreviated to HealthyRHearts, is a randomised control trial set in Primary Care Practises in rural areas of the Hunter New England and Central Coast Primary Health Network (HNECC PHN). This area is in the state's highest CVD mortality band, with cardiovascular disease responsible for 28% of all deaths.[2,18] The aim of HealthyRHearts is to improve diet-related risk factors for CVD in rural adults at moderate to high CVD risk using a telehealth personalised MNT intervention delivered by an APD. The present study describes development of the HealthyRHearts telehealth MNT intervention using the 14-item GUIDance for rEporting of intervention Development (GUIDED) checklist for the purpose of improving intervention transparency and replication (see Supporting information, File S1).[19] Frameworks, theories and tools are referenced, alongside explanations of their use in the development process.

METHODS

Setting

HealthyRHearts was developed by a University of Newcastle (UON) research team based in the Hunter New England (HNE) area of the state of New South Wales (NSW), Australia. The intervention was developed to be delivered online via telehealth, and then implemented into rural areas of the HNECC PHN classified as Modified Monash Model levels 3–5.[20]

Target population and stakeholders

The HealthyRHearts target population include the intervention end users. These are:

- Patients of rural primary care practices, aged 45–75 years, with access to email and internet, who have attended a Heart Health Assessment (MBS item number 699) and been assessed by their General Practitioner (GP) as being at moderate to high risk of CVD according to the Heart Foundation's Absolute CVD Risk Calculator,[21]
- Rurally based dietitians and
- General practice staff, including GPs and practice nurses.[6]

Stakeholders of HealthyRHearts are members of the research team including researchers from the HNECC PHN, Hunter Medical Research Institute, The National Heart Foundation of Australia, NSW Regional Health Partners, and UON.

Intervention development

Theoretical approach and published literature

Published literature informed the development of HealthyRHearts, the approach to developing the behaviour-change component of the intervention and key aspects of the intervention protocol.

User-centred design

The development of HealthyRHearts was guided by user-centred design (UCD), which involves the design of an intervention based on information about the people who will ultimately use the intervention.[17] The purpose of this is to enhance intervention implementation by ensuring contextual appropriateness for the target population.[17] There are many UCD strategies, with some examples including identification of users and their needs, engaging in live prototyping and rapid iteration based on usability tests.[17] UCD strategies are not clearly described in many telehealth interventions, especially in rural areas, despite rural health professionals perceiving a need for greater collaboration with local healthcare workers in the design of rural telehealth services.[17,22,23]

UCD strategies employed by the HealthyRHearts research team included identifying users and needs through the development of a program logic model, building a user-centred organisational culture by ensuring some research staff were rurally based, facilitating end-user dialogue in the intervention development process through usability tests, and developing the intervention iteratively to consider end-user feedback.[17]

Behaviour-change theory and counselling strategies

The Capability, Opportunity, Motivation and Behaviour (COM-B) system and the Behaviour Change Wheel framework informed the operation of two behaviour change tools used in the HealthyRHearts intervention, namely the Personalised Nutrition Questionnaire (PNQ) and Personalised Nutrition Toolbox (PNT).[24–27] The PNQ and PNT were developed iteratively across previous telehealth nutrition interventions,[24–26,28] and adapted for HealthyRHearts (see Supporting information, File S2) The PNQ asks participants to identify capability, opportunity and motivation factors that impact their dietary behaviours, and the PNT maps identified factors to intervention functions and resources that can assist in addressing these.[26] The adapted PNQ and PNT were integrated into HealthyRHearts intervention to support participants to self-identify barriers to healthy eating and assist dietitians in choosing behaviour change interventions and resources to support participants in overcoming these barriers.

Behaviour change counselling skills emphasised within the intervention were informed by the principles of Healthy Conversations Skills.[29] Healthy Conversation Skills is a person-centred approach to health behaviour change, where health professionals use communication skills to empower their patients or clients to find their own solutions and identify strategies for change.[29] HealthyRHearts integrated three communication strategies emphasised in Healthy Conversation Skills; the use of open discovery questions, reflective listening; and the creation of Specific, Measurable, Action-oriented, Realistic, Timed, Evaluated and Reviewed (SMARTER) goals for dietary change.[29] These skills were emphasised in the training provided to dietitians who delivered MNT within the HealthyRHearts intervention.

The Nutrition Care Process

The Nutrition Care Process (NCP) guided the development of dietitian consult session plans.[30] NCP is a systemic approach to providing high-quality nutrition care by following four steps: (1) Assessment; (2) Diagnosis; (3) Intervention; and (4) Monitoring and Evaluation (ADIME).[30] HealthyRHearts intervention was designed so that each NCP step was complete by the end of the initial dietitian consultation. Elements of nutrition assessment, including participant anthropometry, biochemistry, client history, food and nutrition history, were designed to be obtained prior to dietitian telehealth consultations to streamline the intervention.

Telehealth design framework

The development of the telehealth component of HealthyRHearts intervention was informed by the "Telemedicine

service encounter quality model" developed by Le Rouge et al.,[31,32] and adapted to include additional points relating to clinician telepresence from the research of Henry et al.[33,34] and national health guidelines.[35–37] From this, three key facilitators of successful telehealth service design were identified: (1) ensuring appropriate communication infrastructure such as hardware and software is available to facilitate telehealth; (2) providing staff and participants with appropriate training and support to participate in the telehealth service; and (3) emphasising clinician telepresence and patient centred care during dietitian training and consultations.[31–37] The application of these telehealth components within the HealthyRHearts intervention is summarised in Table 1.[31,32]

HealthyRHearts protocol development

Development of the HealthyRHearts intervention protocol followed the theoretical framework underpinning the HealthyRHearts intervention. This involved mapping the intervention processes, selecting appropriate software, developing intervention resources and developing the dietitian training module. End-user feedback on the intervention protocol was sought at different stages of development, with modifications made to accommodate feedback.

Intervention mapping and software selection

Each step of HealthyRHearts intervention was mapped to confirm intervention requirements, including who would be responsible for completing each step, what software would be required and how the data collected at each step contributed to the NCP (Figure 1)

Completion of each intervention step was assigned to one of four possible roles. A GP was required to complete the patient Heart Health Assessment, calculate absolute CVD risk, and then refer eligible participants to the intervention. Participants were required to complete their individual food frequency questionnaire-based dietary assessment, the Australian Eating Survey-Heart version (AES-Heart) and PNQ prior to their appointment. A dietitian coordinator from the research team (JH) trained the dietitians and coordinated dietitian appointment scheduling and communications of patient dietary assessment and other consultation outcomes back to GPs. An APD who had lived and/or worked in a rural area in the previous 12 months was required to deliver the dietitian consultations with intervention participants.

Software was selected for each step of the HealthyRHearts intervention based on purpose and appropriateness for each person completing each step.

Given that HealthyRHearts involved communication between healthcare professionals, as well as between healthcare professionals and their patients, it was essential that the software selected could facilitate safe, secure, online transfer and storage of medical information in line with the Commonwealth Privacy Act 1988, the Australian Privacy Principles and the Health Insurance Portability and Accountability Act (HIPAA).[38] Figure 1 presents the intervention mapping process and Table 2 provides a summary of the software selected for the HealthyRHearts intervention.

Resource development

Once the intervention was mapped and software was selected, several resources were developed for

TABLE 1 Facilitators of successful telehealth service design identified in literature and their application to HealthyRHearts

Facilitator	Components of facilitator	Application of facilitator to HealthyRHearts telehealth service design
Communication infrastructure[31,32,35–37]	Hardware	Participants/dietitians required internet connectivity, email and computer/phone that can transmit audio and/or visual to participate in HealthyRHearts
	Software	Software was chosen to facilitate online referral, telehealth consultation compliant with Australian privacy standards, safe online communication between healthcare professionals
	Telehealth environment	Participants/dietitians were provided information in their manual's on how to set up their physical environment to optimise their communication
Service support[31,32]	Clinician/participant training	Dietitian training included a telehealth module to familiarise dietitians with the telehealth software. Participants were provided educational materials to support them to attend the HealthyRHearts consultations
	Troubleshooting	Dietitians and participants could access technical and scheduling support through the research team and the video-conferencing software support centre
Clinician communication skills[31–37]	Patient-centred care	Dietitian training included section on how to optimise telepresence and patient centred care in telehealth using physical strategies as well as the principles of behaviour change counselling skills

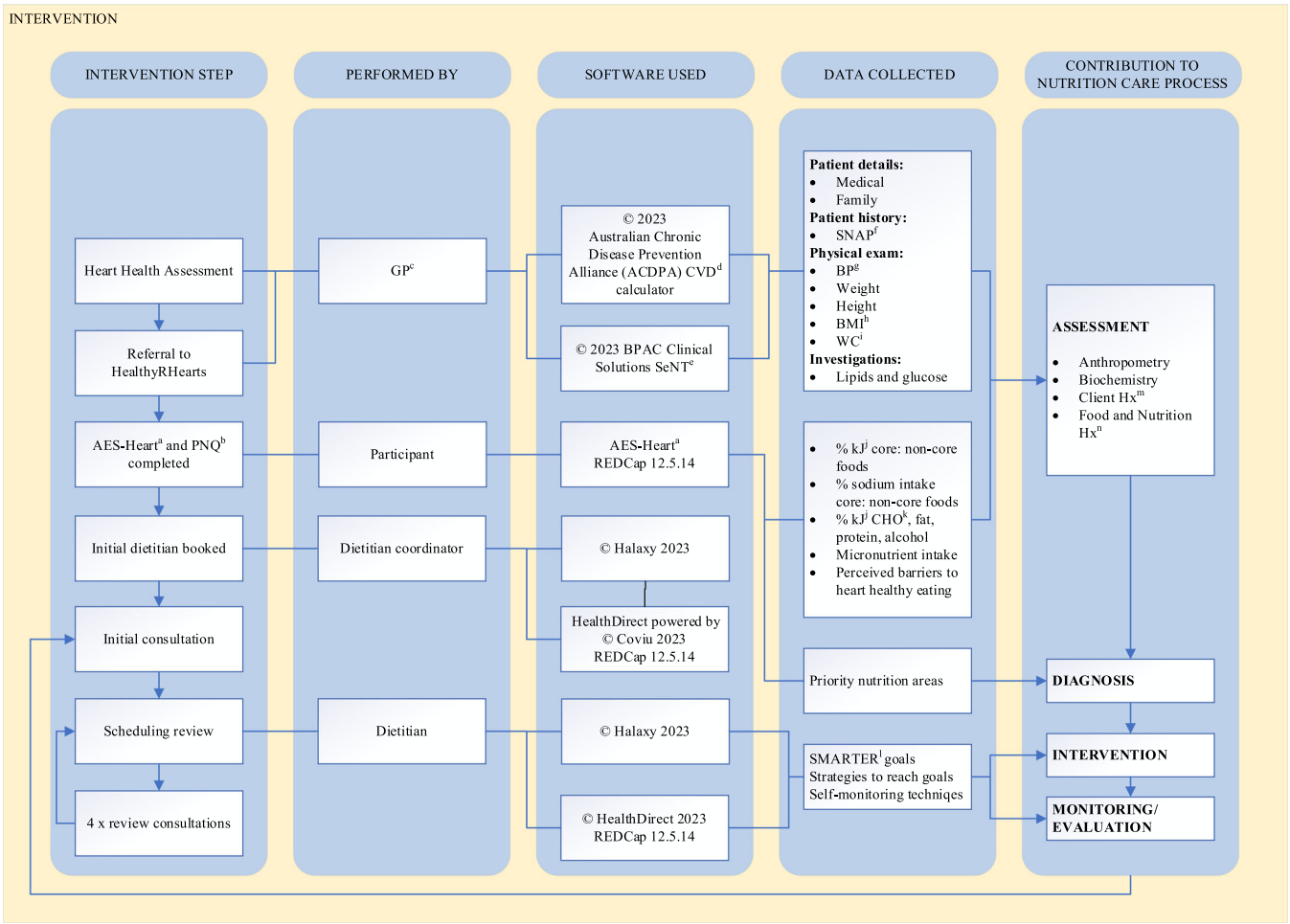

FIGURE 1 Mapping of the HealthyRHearts intervention steps, who completed each step, software used, data collected and how this data contributed to the Nutrition Care Process. [a]Australian Eating Survey Heart version, [b]Personalised Nutrition Questionnaire, [c]general practitioner, [d]cardiovascular disease, [e]Secure eReferral Network Transfer, [f]Smoking, Nutrition, Alcohol, Physical Activity, [g]blood pressure, [h]body mass index, [i]waist circumference, [j]kiloujoules, [K]carbohydrate, [l]Specific, Measurable, Activity-oriented, Realistic, Timed, Evaluation, Review, [m]client history and [n]food and nutrition history.

dietitians and participants of the intervention. The dietitian resources were developed from current literature or adapted from resources used in previous interventions.[6,24,44–47] Resources developed for the HealthyRHearts MNT intervention are summarised in Table 3.

Iterative development of dietitian training module

A training module was developed for dietitians employed to deliver the HealthyRHearts MNT consultations, adapted from previous telehealth training.[46] The module was designed to be delivered online to be consistent with COVID-19 lockdown measures and included self-paced online material as well as synchronous Zoom sessions. Table 4 provides a summary of each section of the training and required materials.

Feedback on the intervention protocol and training module was sought from rurally based dietitians before and after the training module. Prior to the training module, researchers sought feedback from dietitians on the intervention protocol, resources, and materials. Changes were made to the materials to accommodate this feedback. Throughout the training, dietitians were involved in pilot tests of the intervention protocol. These were completed with the dietitian coordinator (JH) and tested the intervention processes and software through the completion of a practice consult beginning with participant scheduling through to the finalisation of an initial consultation. Throughout this process, pragmatic solutions were developed iteratively as challenges arose. Dietitians were also asked to provide feedback on the training module through process evaluation surveys. Key changes made to the intervention protocol are outlined in the Supporting information (File S3).

TABLE 2 Function, required features and details of software selected for HealthyRHearts Medical Nutrition Therapy intervention

Software function	Required features	Software selected
Referral	Secure online transferral of medical information between GP and other healthcare professionals	© 2023 BPAC Clinical Solutions Secure eReferral Network Transfer (SeNT)[39]
Practice management	Online scheduling with multiple practitioners Automated and personalised reminder emails	Halaxy © Halaxy 2022[40]
Videocall platform	Sends/receives audio and video, available on mobile, tablet and computer, no downloads required, allows screen sharing and file share, end-to-end encryption and meets national health privacy and security requirements, access to troubleshooting and helpdesk for patient clinician and administrators, free	HealthDirect Video Call powered by © Coviu 2023[41]
Health professional communication	Secure online transferral of dietitian referral acceptance letter to GP	© 2002–2022 Copyright – Medical-Objects – Secure Messaging Delivery – Clinical Applications – Clinical Decision Support[42]
Database	Secure data storage of consultation notes, compliant with research institution security policies	REDCap 12.5.14 – © 2023 Vanderbilt University[43]
Dietary assessment	Online assessment of dietary patterns Collation of dietary patterns into an online report	Australian Eating Survey Heart version

Abbreviation: GP, general practitioner.

TABLE 3 Description of resources developed for the HealthyRHearts Medical Nutrition Therapy intervention

Resource developed	Purpose of resource
For dietitians	
Nutrition for CVD Manual	An online manual summarising latest evidence based dietary interventions for CVD as summarised in the Practise Evidence in Nutrition Guidelines[48]
HealthyRHearts dietetic manual	The dietitian manual detailing essential steps to complete the intervention
Personalised Nutrition Questionnaire (PNQ)	A behaviour change tool modified from a previous version, that asks participants to self-identify barriers they perceive to being able to eat healthily[24,45–47]
Personalised Nutrition Toolbox (PNT)	A compilation of publicly available and specifically developed dietetic resources specific to dietary behaviour change and dietary requirements for CVD. Evidence used in development of resources was consistent with the Heart Foundation Heart Healthy Eating principles and practice-based guidelines.[6,44] The PNT resources correspond with PNQ questions, meaning the dietitian can use PNQ to assist in resource section to personalise support for the participant
For participants	
Manual/webinar	An educational manual and webinar with instruction on how to set up their environment for a telehealth consult and how to join the HealthDirect video-call

Abbreviation: CVD, cardiovascular disease.

RESULTS

The final HealthyRHearts MNT intervention is described using the TIDieR framework.

Item 1: Brief name

Healthy Rural Hearts (HealthyRHearts): a telehealth Medical Nutrition Therapy (MNT) intervention to improve diet-related risk factors for CVD in adults living in rural areas who are at moderate to high risk of CVD.

Item 2: Rationale, theory or goal of the elements essential to the intervention

Receiving MNT from an APD has been shown to reduce diet-related CVD risk factors and is recommended in clinical guidelines.[6] However, there are many barriers to accessing dietitians in rural areas, including distance to services resulting in long travel times, long waiting lists for public dietitians, high cost of private dietetic consultations and fewer service providers.[7–9] The aim of the HealthyRHearts intervention is to improve dietary risk factors for CVD in adults at moderate to high risk of

TABLE 4 Format, content and materials required for each section of the HealthyRHearts dietitian training module

Training section	Time (h)	Format	Content	Materials required
Pre-workshop reading and activities	2	Self-paced online	Background evidence for behaviour change theory and dietary interventions for CVD Access to HealthyRHearts intervention materials Completion of Australian Eating Survey and Personalised Nutrition Questionnaire Completion of training process evaluation survey	Recent systematic reviews relevant to behaviour change theory, CVD and diet[27,49] HealthyRHearts Nutrition for CVD manual HealthyRHearts dietitian manual HealthyRHearts Personalised Nutrition Toolbox Australian Eating Survey – Heart version Personalised Nutrition Questionnaire Pre-training evaluation survey
Zoom workshop	4	Synchronous group Zoom	Study materials and tools Strategies to optimise clinician telepresence Behaviour change philosophy Opportunities to practise intervention processes	Zoom and the training PowerPoint Relevant intervention software
One-on-one practice consultations	2	Synchronous one-on-one using HealthDirect	Completion of practice consultation with HealthyRHearts dietitian coordinator Collection of feedback on intervention processes Completion of post-training survey	Sample data required to complete practice consultation including: • Sample AES report • Sample PNQ survey responsesPost training process evaluation survey

Abbreviations: AES, Australian Eating Survey; CVD, cardiovascular disease; PNQ, Personalised Nutrition Questionnaire.

CVD living in rural areas by improving access to personalised nutrition care from an APD.

Item 3: Materials used in the intervention

Materials required to complete the HealthyRHearts MNT intervention are summarised in Table 5.

Item 4: Procedures, activities and/or processes used in the intervention

Procedures required to complete the HealthyRHearts MNT intervention are summarised in Figure 2.

Item 5: Description of the expertise, background and specific training given to intervention providers

The expertise, background and specific training of each intervention provider is described in Table 6.

Item 6 and 7: Mode of delivery and location(s) where the intervention occurred

The modes and location of delivery of the intervention components are described in Table 7.

Item 8: Number of times the intervention will be delivered and over what period including the number of sessions, their schedule, and their duration, intensity or dose

Participants receive five telehealth consultations with the dietitian over 6-months. The initial consultation is scheduled in the 2 weeks after the participant's first GP appointment. The duration of the initial consult is 30 min. The participant is then scheduled for 20-min review appointments at 2, 4 and 13 weeks post initial consult. The participants' final consult is scheduled 6 months after the initial consult and is 30 min in duration.

Item 9: Tailoring of the intervention

There are several tools and techniques embedded into the intervention to achieve personalisation.

Personalisation tools

Prior to initial consultation, participants are required to complete the PNQ and AES-Heart. The PNQ has been

TABLE 5 Materials required to complete HealthyRHearts Medical Nutrition Therapy intervention

Intervention step	Materials required
Dietitian training	• All materials outlined in Table 4
Intervention delivery	• Internet connectivity suitable for audio and visual transmission • Computer/smart phone with microphone and camera • Access to email • Appropriate software for participant referral and scheduling, videoconferencing, health professional communication and data storage as outlined in Table 2 • Access to resources developed for HealthyRHearts intervention as outlined in Table 3

designed using the COM-B theory of behaviour change and is used to confirm what the participant identifies as key barriers to behaviour change. This is intended to assist the dietitian in the consultations to focus on areas the participant identified in the PNQ. The AES-Heart is a food frequency questionnaire that has been adapted from Australian Eating Survey (AES) to target heart healthy eating principles.[50] The AES-Heart measures the participants dietary intake over the past 3–6 months and, upon completion, automatically generates a personalised report summarising aspects of the participants diet history and how this compared to national heart healthy eating principles and food group and nutrient recommendations.[51,52] The AES report provides participants with personalised feedback on their usual dietary intake, and also provides the dietitian with a detailed report and comparison with national recommendations to focus on in the intervention.

Personalisation techniques

During the training, behaviour change counselling techniques that enhance patient-centred care are re-enforced and prompts to use techniques are embedded into the session plan and initial and review consult forms.

Consideration of subgroups

Consideration is made to accommodate the needs of sub-groups in the target population, including groups with limited familiarity with technology, poor internet access and shift workers with varying scheduling requirements.

The population age range of 45–75 years may result in varying familiarity and literacy regarding technology. To address this, participants are required to have an email address to participate in HealthyRHearts. To accommodate varying ability with technology, all participants randomised into the intervention are emailed the HealthyRHearts participant manual and webinar to support them to connect to the video-conferencing platform for their consults. For participants not confident in navigating the online space, or who have varying internet connectivity, the intervention can be adjusted to be delivered over the phone.

Given the rural location, it is expected that a proportion of the target population may work in agriculture or mining. These occupations often require workers to be unavailable during some times of the day or year, depending on the season, such as harvest and this would affect telehealth appointment scheduling. To account for this, at least one dietitian is available for after-hours consultations so that these participants could still participate in the intervention.

Item 10: Modifications

The intervention was modified throughout development and during the first 6-months of implementation. These modifications are described in the Supporting information (File S3).

Item 11: How adherence or fidelity will be assessed

The dietitian coordinator adheres to processes outlined in the HealthyRHearts dietitian training manual and the HealthyRHearts dietitian coordinator administration manual. This ensures all dietitians receive the same training from the dietitian coordinator and the same processes are followed when managing appointments. The training is recorded and accessible to dietitians for refresher.

The dietitians and participants receive manuals outlining the processes to complete the consultations. A sample of recorded consultations, along with consultation data collected from REDCap and HealthDirect, is analysed to assess dietitian intervention fidelity.

DISCUSSION

HealthyRHearts is a complex intervention that aims to translate a telehealth MNT intervention for CVD prevention into rural and remote primary care settings. The intervention is designed to be implemented across

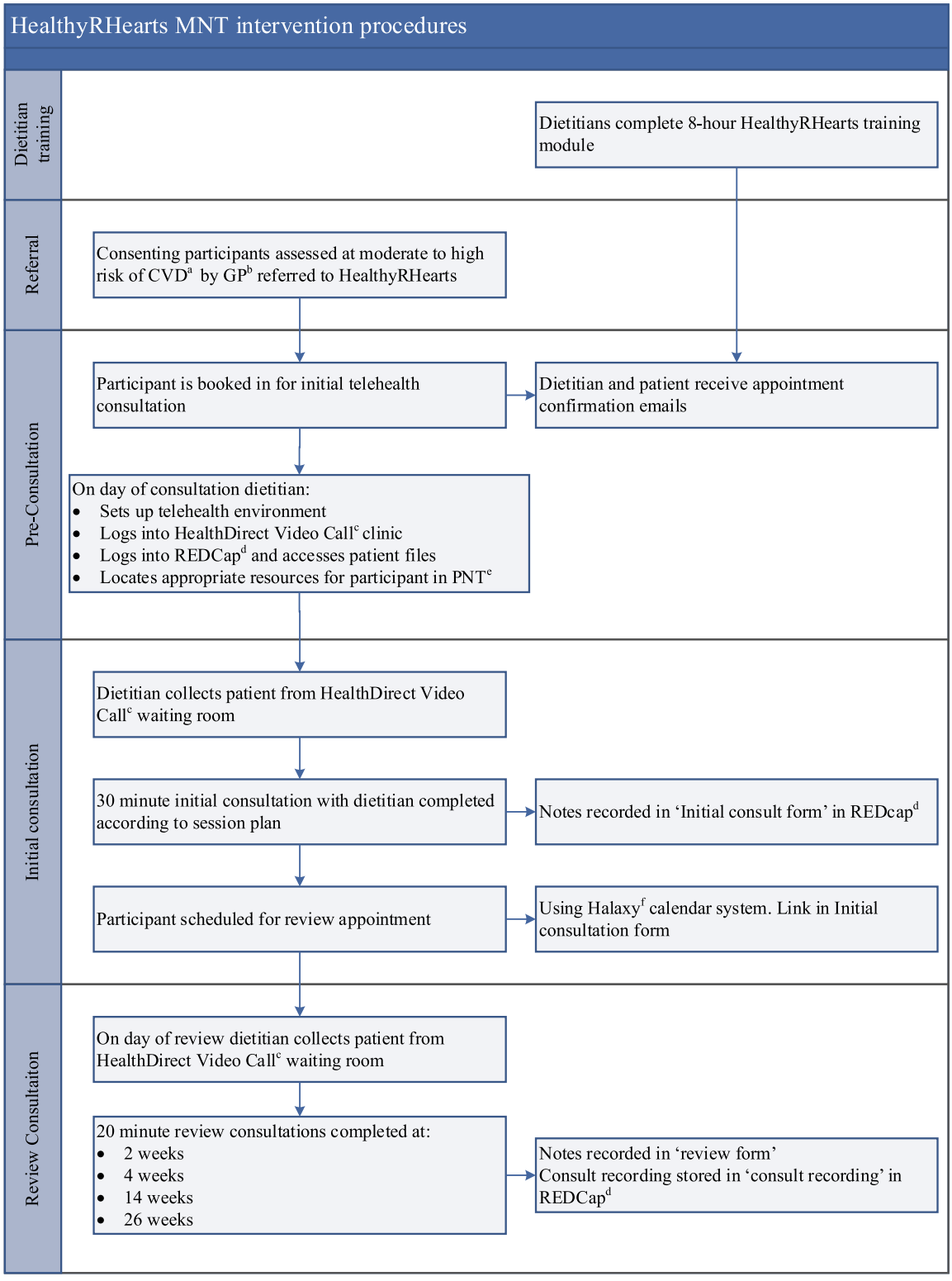

FIGURE 2 Flow chart of HealthyRHearts Medical Nutrition Therapy intervention procedures. [a]Cardiovascular disease, risk assessed using the Absolute cardiovascular disease risk calculator,[21] [b]general practitioner, refers participant using the Hunter New England Secure eReferral Network Transfer,[39] [c]HealthDirect Video Call powered by © Coviu 2023,[41] [d]REDCap 12.5.14 – © 2023 Vanderbilt University.[43]

TABLE 6 Description of the expertise, background, and training of the HealthyRHearts MNT intervention providers

Intervention provider	Expertise, background, and training
Dietitian coordinator	The dietitian coordinator is an Accredited Practising Dietitian and PhD candidate involved in design of intervention processes, tools, and resources. The dietitian coordinator facilitates the dietitian training and coordinates referrals and scheduling of consultations.
General practitioners	General Practitioners involved in the study must be working for consenting practices in Modified Monash areas 3–5 of the Hunter New England Central Coast Primary Health Network who use Best Practise or Medical Director practice management systems. General practitioners will assess participant absolute cardiovascular risk, refer eligible participants into the study and provide usual care to patients throughout intervention duration.
Accredited practising dietitians	Accredited practising dietitians will deliver HealthyRHearts Medical Nutrition Therapy. Dietitians are required to have: • Lived and worked in a rural area in the last 12 months. • Have completed the study specific training

TABLE 7 Modes and location of delivery of each component of the intervention

Intervention component	Mode of delivery	Location of delivery
Dietitian training	Asynchronous, online, completed individually. Synchronous, online, completed in group using Zoom	Dietitians attended online from dietitian home or office. The Dietitian Coordinator delivering the training was based at the UONDRH[a], Tamworth
CVD[b] risk assessment	Face-to-face, between general practice staff and participant	The CVD[b] risk assessment was completed on site at the participant primary care practice which was in an HNECC PHN[c] areas categorised as MM 3–6[d]
Referral of participant	Online, using SeNT[e] referral form[39]	General practitioners completed the online referral from the practice
Consultation scheduling	A combination of telephone calls and use of online booking systems	The dietitian coordinator completed participant scheduling from the University of Newcastle Department of Rural Health, Tamworth
MNT intervention	Synchronous, videoconference/telephone call, between dietitian and participant	Dietitians can conduct consultations offsite at their home or office or onsite at the UONDRH[a], Tamworth Participants can join the consults from their home or private location of their choosing

[a]University of Newcastle Department of Rural Health.
[b]Cardiovascular Disease.
[c]Hunter New England and Central Coast Primary Health Network.
[d]Modified Monash Model categories 3-6.
[e]Hunter New England Secure eReferral Network Transfer.[39]

multiple sites of varying characteristics and needs, with the ability to accommodate individual complexities within the rural context and target population. The current paper describes the intervention development process using the GUIDED framework as a guide. (see Supporting information, File S1)[19] This provides a platform for detailed description of decision-making pathways for each element of the intervention design, including the context, purpose, target population, underpinning theories and evidence base, use of existing interventions, guiding principles, stakeholder involvement, and changes made throughout the development process.[19] The comprehensive description of the intervention development process for HealthyRHearts is intended to facilitate replication, iteration, and optimisation of the intervention for rural contexts.

Development processes for face-to-face and telehealth nutrition interventions for CVD prevention in rural areas across the globe have not been well documented to date.[49,53] Nutrition interventions for CVD currently focus on reporting effectiveness and feasibility outcomes rather than providing a comprehensive description of the intervention development approach.[5,15,49,53] Although evidence has been synthesised and confirms effectiveness and feasibility of nutrition interventions to improve diet-related CVD risk, the limited and/or poor reporting of design elements makes replicability and translation of these interventions into practice difficult.[5,15,49,53] Given that knowledge translation of nutrition intervention to lower CVD risk is limited, improving both the design and reporting of these interventions is a priority.[49]

Previous research has identified that telehealth is not always well accepted amongst health providers, including those working in rural locations.[22,54] Staff in rural Australia and internationally report concerns regarding telehealth as a model of care because it may be perceived as a lesser service that may not be contextually appropriate.[22,55] Provider satisfaction with telehealth

has been found to improve if providers have input into service development, as well as access to administrative support, and the service utilises reliable technology that is easy to use.[22,54]

Given this intervention is to be delivered in rural areas using a telehealth model, user-centred design strategies that ensure the intervention was contextually appropriate were prioritised in the intervention development. These strategies included ensuring most staff working on the intervention were living in the rural areas, delivering a comprehensive theory-based training module to dietitians working on the intervention, which included a piloting session and opportunity for dietitian feedback, as well as regularly consulting local stakeholders and end-users during intervention development. To improve the potential for future intervention translation into practise, a comprehensive feasibility assessment and intervention development documentation was built into the intervention design to ensure thorough reporting of methods and outcomes.

The next step of the HealthyRHearts project will be to report intervention feasibility in the target population before evaluating effectiveness and cost-effectiveness in a randomised control trial. The reporting of intervention development, feasibility and effectiveness outcomes for the HealthyRHearts intervention is intended to enable healthcare professionals and researchers to understand the quality and relevance of the intervention for their context.

CONCLUSIONS

HealthyRHearts aims to translate a telehealth MNT intervention for CVD prevention into rural and remote primary care settings. The present study describes the development of the telehealth MNT intervention using the GUIDED and TIDieR frameworks (see Supporting information, File S1)[19] This results in comprehensive description of the intervention development process and is intended to facilitate replication, iteration and optimisation of the intervention for rural contexts.

AUTHOR CONTRIBUTIONS

JH prepared the first draft with contributions from CEC, TS and LB. All authors reviewed subsequent drafts and approved the final version of the manuscript submitted for publication.

ACKNOWLEDGEMENTS

This project has been approved by the University's Human Research Ethics Committee, Approval No. H-2021-0193. The Healthy Rural Hearts project is supported by a Medical Research Futures Fund Primary Health Care Research Grant (APP1200481). CEC is supported by a National Health and Medical Research Council of Australia Leadership (L3) Research Fellowship (APP2009340). JH is supported by a 2020 UON Research Scholarship External (UNRSE) scholarship. The Australian Eating Survey® is a food frequency questionnaire that is available for use on a fee-paying basis and is managed by the University of Newcastle. Open access publishing facilitated by The University of Newcastle, as part of the Wiley - The University of Newcastle agreement via the Council of Australian University Librarians.

CONFLICTS OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest.

TRANSPARENCY DECLARATION

The lead author affirms that this manuscript is an honest, accurate and transparent account of the study being reported. The reporting of this work is compliant with GUIDED guidelines. The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned have been explained.

ORCID

Jaimee Herbert http://orcid.org/0000-0002-4757-8905
Clare E. Collins http://orcid.org/0000-0003-3298-756X

PEER REVIEW

The peer review history for this article is available at https://www.webofscience.com/api/gateway/wos/peer-review/10.1111/jhn.13193.

REFERENCES

1. Australian Institute of Health and Welfare. Heart, stroke and vascular disease—Australian facts. Canberra: AIHW; 2021.
2. Australian Institute of Health and Welfare. Rural & remote health: Australian Government; 2019. Available from: https://www.aihw.gov.au/reports/rural-health/rural-remote-health/contents/rural-health
3. Australian Bureau of Statistics. The Australian Statistical Geography Standard (ASGS) Remoteness structure; 2021. Available from: https://www.abs.gov.au/websitedbs/d3310114.nsf/home/remoteness+structure
4. Australian Government Department of Health. Modified Monash Model Canberra; 2021. Available from: https://www.health.gov.au/health-topics/health-workforce/health-workforce-classifications/modified-monash-model
5. Ross LJ, Barnes KA, Ball LE, Mitchell LJ, Sladdin I, Lee P, et al. Effectiveness of dietetic consultation for lowering blood lipid levels in the management of cardiovascular disease risk: a systematic review and meta-analysis of randomised controlled trials. Nutr Diet. 2019;76(2):199–210.
6. National Vascular Disease Prevention Alliance. Guidelines for the management of absolute cardiovascular disease risk; 2012.
7. Pomeroy SEM, Cant RP. General practitioners' decision to refer patients to dietitians: insight into the clinical reasoning process. Aus J Primary Health. 2010;16(2):147–53.
8. Kim KK, Yeong L-L, Caterson ID, Harris MF. Analysis of factors influencing general practitioners' decision to refer obese patients in Australia: a qualitative study. BMC Fam Pract. 2015;16(1):1–8.

9. Siopis G, Jones A, Allman-Farinelli M. The dietetic workforce distribution geographic atlas provides insight into the inequitable access for dietetic services for people with type 2 diabetes in Australia. Nutr Diet. 2020;77(1):121–30.
10. Alston L, Partridge SR. Limited dietary interventions in rural Australian communities: a systematic review. Nutr Diet. 2021;78(1):57–68.
11. Australian Government Department of Health. MBS changes factsheet. In: Health Do, editors; 2022.
12. Snoswell CL, Caffery LJ, Hobson G, Taylor ML, Haydon HM, Thomas E, et al. Telehealth and coronavirus: Medicare Benefits Schedule (MBS) activity in Australia. The University of Queensland: A.C. Centre for Online Health; 2021. Available from: https://coh.centre.uq.edu.au/telehealth-and-coronavirus-medicare-benefits-schedule-mbs-activity-australia
13. Snoswell CL, Caffery LJ, Haydon HM, Thomas EE, Smith AC. Telehealth uptake in general practice as a result of the coronavirus (COVID-19) pandemic. Aus Health Rev. 2020;44(5):737–40.
14. Snoswell CL, Chelberg G, De Guzman KR, Haydon HH, Thomas EE, Caffery LJ, et al. The clinical effectiveness of telehealth: a systematic review of meta-analyses from 2010 to 2019. J Telemed Telecare. 2021:1357633X2110229.
15. Kelly JT, Reidlinger DP, Hoffmann TC, Campbell KL. Telehealth methods to deliver dietary interventions in adults with chronic disease: a systematic review and meta-analysis. Am J Clin Nutr. 2016;104(6):1693–702.
16. Widmer RJ, Collins NM, Collins CS, West CP, Lerman LO, Lerman A, et al. Digital health interventions for the prevention of cardiovascular disease: a systematic review and meta-analysis. Elsevier; 2015.
17. Dopp AR, Parisi KE, Munson SA, Lyon AR. Integrating implementation and user-centred design strategies to enhance the impact of health services: protocol from a concept mapping study. Health Res Policy Syst. 2019;17(1):1.
18. Centre for Epidemiology and Evidence. HealthStats NSW Sydney: NSW Ministry of Health; 2021. Available from: https://beta.healthstats.nsw.gov.au/#/r/100002
19. Duncan E, O'Cathain A, Rousseau N, Croot L, Sworn K, Turner KM, et al. Guidance for reporting intervention development studies in health research (GUIDED): an evidence-based consensus study. BMJ Open. 2020;10(4):e033516.
20. Health AGDo. Modified Monash Model Canberra: Australian Government Department of Health; 2021. Available from: https://www.health.gov.au/health-topics/health-workforce/health-workforce-classifications/modified-monash-model
21. The Heart Foundation of Australia. Absolute CVD risk calculator: The Heart Foundation; 2023. Available from: https://www.heartfoundation.org.au/bundles/for-professionals/cvd-risk-calculator
22. Kocanda L, Fisher K, Brown LJ, May J, Rollo ME, Collins CE, et al. Informing telehealth service delivery for cardiovascular disease management: exploring the perceptions of rural health professionals. Aus Health Rev. 2021;45(2):241–6.
23. Orlando JF, Beard M, Kumar S. Systematic review of patient and caregivers' satisfaction with telehealth videoconferencing as a mode of service delivery in managing patients' health. PLoS One. 2019;14(8):e0221848.
24. Rollo ME, Baldwin JN, Hutchesson M, Aguiar EJ, Wynne K, Young A, et al. The feasibility and preliminary efficacy of an eHealth lifestyle program in women with recent gestational diabetes mellitus: a pilot study. Int J Environ Res Public Health. 2020;17(19):7115.
25. Rollo ME, Burrows T, Vincze LJ, Harvey J, Collins CE, Hutchesson MJ. Cost evaluation of providing evidence-based dietetic services for weight management in adults: in-person versus eHealth delivery. Nutr Diet. 2018;75(1):35–43.
26. Rollo ME, Haslam RL, Collins CE. Impact on dietary intake of two levels of technology-assisted personalized nutrition: a randomized trial. Nutrients. 2020;12(11):3334.
27. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. Implement Sci. 2011;6(1):42.
28. Rollo ME, Hutchesson MJ, Burrows TL, Krukowski RA, Harvey JR, Hoggle LB, et al. Video consultations and virtual nutrition care for weight management. J Acad Nutr Diet. 2015;115(8):1213–25.
29. Hollis JL, Kocanda L, Seward K, Collins C, Tully B, Hunter M, et al. The impact of Healthy Conversation Skills training on health professionals' barriers to having behaviour change conversations: a pre-post survey using the Theoretical Domains Framework. BMC Health Serv Res. 2021;21(1):880.
30. Hammond MI, Myers EF, Trostler N. Nutrition care process and model: an academic and practice odyssey. J Acad Nutr Diet. 2014;114(114):1879–94.
31. LeRouge C, Garfield MJ, Hevner AR, editors. Quality attributes in telemedicine video conferencing 2002: IEEE.
32. LeRouge CM, Garfield MJ, Hevner AR. Patient perspectives of telemedicine quality. Patient Prefer Adherence. 2015;9:25–40.
33. Henry BW, Block DE, Ciesla JR, McGowan BA, Vozenilek JA. Clinician behaviors in telehealth care delivery: a systematic review. Adv Health Sci Edu. 2017;22(4):869–88.
34. Henry BW, Ames LJ, Block DE, Vozenilek JA. Experienced practitioners' views on interpersonal skills in telehealth delivery. Inter J Allied Health Sci Prac. 2018;16(2):2.
35. Agency for Clinical Innovation. Virtual Care in Practice. Agency for Clinical Innovation; 2021.
36. Royal Australian College of General Practitioners. Telehealth video consultations guide East Melbourne, Vic: RACGP; 2019. Available from: https://www.racgp.org.au/getmedia/764ab82e-7dea-434e-94ca-cab808f7b5eb/Telehealth-video-consultations-guide.pdf.aspx
37. Ausmed A. Guide to video telehealth consultations; 2020. Available from: https://www.ausmed.com.au/cpd/articles/telehealth-consultations
38. Health Direct Video Call. Privacy, Security and Scalability: How Video Call consultations are made secure and private at scale; 2023. Available from: https://help.vcc.healthdirect.org.au/about-healthdirect-video-call/privacysecurityandscalability
39. BPAC Clinical Solutions. Secure eReferral Network Transfer (SeNT); 2023. Available from: https://www.bpacsolutions.com.au/products-sent/
40. Halaxy Pty Ltd. Halaxy; 2023. Available from: https://www.halaxy.com/
41. Healthdirect. Healthdirect Video Call. Available from: https://vcc.healthdirect.org.au/login
42. Medical-Objects Pty Ltd. Medical-objects: clinical applications, messaging and integration: 2002–2022. Available from: https://www.medicalobjects.com/
43. REDCap: Research Electronic Data Capture. Available from: https://www.project-redcap.org/
44. Dietitians of Canada. Cardiovascular Disease—Dyslipidemia, summary of recommendations and evidence: Practice Evidence in Nutrition (PEN) The global resource for nutrition practise; 2017. Available from: https://www.pennutrition.com/KnowledgePathway.aspx?kpid=2878&trid=4149&trcatid=42#5
45. Brain K, Burrows T, Rollo M, Hayes C, Hodson F, Collins C. The effect of a pilot dietary intervention on pain outcomes in patients attending a tertiary pain service. Nutrients. 2019;11(1):181.
46. Haslam RL, Pezdirc K, Truby H, Attia J, Hutchesson M, Burrows T, et al. Investigating the efficacy and cost-effectiveness of technology-delivered personalized feedback on dietary patterns in young Australian adults in the advice, ideas, and motivation for my eating (Aim4Me) study: protocol for a randomized controlled trial. JMIR Res Protoc. 2020;9(5):e15999.
47. Taylor R, Rollo ME, Baldwin JN, Hutchesson M, Aguiar EJ, Wynne K, et al. Evaluation of a Type 2 diabetes risk reduction online program for women with recent gestational diabetes: a randomised trial. Int J Behav Nutr Phys Act. 2022;19(1):35.

48. Dietitians of Canada. Cardiovascular disease—summary of recommendations: practice Evidence in Nutrition (PEN) The global resource of nutrition practice; 2018. Available from: https://www.pennutrition.com/KnowledgePathway.aspx?kpid=2671&trid=3489&trcatid=42
49. Schumacher TL, Burrows TL, Neubeck L, Redfern J, Callister R, Collins CE. How dietary evidence for the prevention and treatment of CVD is translated into practice in those with or at high risk of CVD: a systematic review. Public Health Nutr. 2017;20(1):30–45.
50. Collins CE, Boggess MM, Watson JF, Guest M, Duncanson K, Pezdirc K, et al. Reproducibility and comparative validity of a food frequency questionnaire for Australian adults. Clin Nutr. 2014;33(5):906–14.
51. The Heart Foundation of Australia. Healthy eating to protect your heart—What does a heart-friendly diet look like?: The Heart Foundation; 2021. Available from: https://www.heartfoundation.org.au/heart-health-education/healthy-eating
52. National Health and Medical Research Council. Australian Dietary Guidelines Summary. Canberra: National Health and Medical Research Council; 2013.
53. Kocanda L, Brain K, Frawley J, Schumacher TL, May J, Rollo ME, et al. The effectiveness of randomized controlled trials to improve dietary intake in the context of cardiovascular disease prevention and management in rural communities: a systematic review. J Acad Nutr Diet. 2021;121(10):2046–70.
54. Nguyen M, Waller M, Pandya A, Portnoy J. A review of patient and provider satisfaction with telemedicine. Curr Allergy Asthma Rep. 2020;20(11):72.
55. Pullyblank K. A scoping literature review of rural beliefs and attitudes toward telehealth utilization. West J Nurs Res. 2022;45(4):01939459221134374.

AUTHOR BIOGRAPHIES

Jaimee Herbert is an Accredited Practising Dietitian and PhD Candidate studying through the University of Newcastle School of Health Sciences (Nutrition and Dietetics), Australia, and working from the University of Newcastle Department of Rural Health, Tamworth, NSW.

Tracy Schumacher was awarded her PhD in 2016 and is a Mid-Career nutrition researcher and project manager of the Healthy Rural Hearts trial, based at the University of Newcastle Department of Rural Health, Tamworth, NSW.

Leanne J. Brown is an Advanced Accredited Practising Dietitian, Associate Professor in Nutrition and Dietetics and Deputy Director at the University of Newcastle Department of Rural Health, Tamworth, NSW.

Clare E. Collins AO is Laureate Professor in Nutrition and Dietetics, University of Newcastle and currently Director of the Food and Nutrition Program, Hunter Medical Research Institute, Newcastle, NSW. She holds a National Health and Medical Research Council of Australia Investigator Grant research fellowship (L3).

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Herbert J, Schumacher T, Brown LJ, Collins CE. Developing a telehealth medical nutrition therapy (MNT) service for adults living in rural Australia at risk of cardiovascular disease: An intervention development study. J Hum Nutr Diet. 2023;36:1782–1794. https://doi.org/10.1111/jhn.13193