

A feasibility study of combined hyperbaric oxygen treatment and a lifestyle medicine program for multimorbid conditions

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Keywords

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Abstract

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Introduction: Multimorbidity and polypharmacy are highly prevalent among patients receiving hyperbaric oxygen treatment (HBOT). Lifestyle Medicine (LM) interventions improve health outcomes in chronic disease management, but their implementation in tertiary hospital settings remains poorly studied and not at all in hyperbaric therapy. We evaluated the feasibility and acceptability amongst patients and staff of delivering a Lifestyle Medicine Program (LMP) within a small hyperbaric medicine department.

Methods: A six-week, open-label, feasibility study was conducted at the Department of Diving and Hyperbaric Medicine, Royal Hobart Hospital. The LMP comprised weekly group education sessions on the six pillars of LM, underpinned by motivational interviewing, and supported by newsletters. Acceptability (participant satisfaction ratings, recommendation rates, perceived value) and feasibility (enrolment, session attendance, retention, engagement, resource use, cost analysis, program delivery, and safety) were assessed via mixed methods data analysis on participant and staff feedback through questionnaires and focus groups.

Results: Twelve patients were recruited via rolling recruitment; 11 completed post-program questionnaires. Participants perceived the LMP as acceptable, safe, and valuable, with 11/11 recommending the program and 10 reporting it beneficial. Qualitative themes from short answers and focus groups indicated that the group-based education fostered social connection and self-agency, though challenges in accessibility, program framing, and therapeutic alliance with HBOT highlighted areas for improvement to enhance feasibility and integration within clinical care. Seventeen staff completed their questionnaire, indicating that the LMP was perceived as beneficial, valuable, and achievable with the hyperbaric setting, provided that minor logistical and structural modifications are made.

Conclusions: Delivering a LMP alongside HBOT is feasible in a tertiary hospital setting, with potential to enhance patient wellbeing and complement clinical care. Larger, multi-site trials are needed to evaluate scalability, inclusivity, and long-term feasibility outcomes.

Introduction

Multimorbid conditions affect 38% of Australians (9.2 million people in 2022) and are defined by the presence of two or more chronic illnesses.^{1,2} Polypharmacy, the use of more than five medications, is common among patients with multimorbidity.^{3,4} These conditions disproportionately affect individuals with lower social determinants of health, advanced age, frailty, impaired development, or cognition, comorbid mental health conditions fragmented medical care, and institutionalisation.^{1,2,4}

Hyperbaric medicine is accessible in every state capital of Australia (plus Darwin and Townsville), is primarily utilised for hypoxic tissue repair and healing, including diabetic foot wounds and soft tissue radiation injury.⁵ The Department of Diving and Hyperbaric Medicine at the Royal Hobart Hospital services the population of Tasmania, approximately 576,000 people, providing upward of 2,500 hyperbaric treatments annually.⁶ From the principal investigator's (PI's) clinical experience, patients undergoing hyperbaric oxygen treatment (HBOT) typically present with multimorbidity and polypharmacy. HBOT is an acceptable and well tolerated therapy for patients.^{7–10}

Table 1
The six pillars of Lifestyle Medicine

Pillar	Description
Nutrition	Emphasises whole, real food, minimally processed dietary patterns tailored to culture and context of the person, with limiting ultra-processed foods and excess added sugar.
Physical activity	Regular, enjoyable movement and structured exercise to improve cardiovascular, metabolic and musculoskeletal health, thereby reducing sedentary behaviour, and support functional capacity.
Sleep	Addressing sleep quantity and quality with assessment and management of sleep timing, maintenance and behaviours as restorative sleep supports metabolic, cognitive and emotional health.
Stress management	Structured approaches to reduce adverse psychological and physiological effects of negative stress integrated into person-centred care.
Addressing risky behaviours/ substances	Identification and reduction/elimination of tobacco, harmful alcohol consumption and other risky substance use and behaviours, including gambling, screen usage, etc.
Social connection	Generating and nurturing meaningful personal and social relationships and community engagement (including cultural/community supports).

Lifestyle medicine (LM) is an emerging discipline shown to improve health parameters for both prevention and management of chronic conditions, with benefits extending to patient wellbeing and health equity, deprescribing, health system sustainability, and healthcare provider satisfaction.^{4,11–21}

LM incorporates environmental, motivational, and behaviour-change principles delivered with structured interventions and evidence-based clinical applications of healthy lifestyle behaviours to prevent, treat, and often reverse chronic disease alongside conventional medical care.^{13,15} The healthy lifestyle behaviours are often referenced as the ‘six pillars’ of LM, including nutrition, physical activity, sleep, stress management, social connection, and avoidance of risky substances and behaviours (Table 1).²² These six pillars are applied to the individual according to their biopsychosocial, cultural and spiritual needs.

While LM has been extensively studied in chronic disease disorders where “*the goal is to establish LM as a bedrock and foundation of primary care*”, there is a paucity of evidence exploring its implementation in tertiary or hospital-based contexts.^{21,23,24} No published research has examined the integration of lifestyle medicine programs (LMPs) into hyperbaric departments, despite their patient populations having a high degree of multimorbidity and therefore theoretically well-suited for such interventions. This research and practice gap limits the ability to extend LM approaches into specialised hospital environments.

This unique hospital setting and treatment course provides an opportunity for an education-based LM approach that can be embedded into standard HBOT care with the prospect of minimal interruption to services, staff, patients, or budget. Establishing determinants of feasibility (acceptability, demand, implementation, practicality, integration and limited-efficacy testing) for this study through feedback from participants and staff utilising a rigorous mixed methods approach will provide a template to generate enhanced insights to inform future implementation trials.²⁵ This work aligns with the 2021–2030 National Preventative Health Strategy, using lifestyle improvements as an affordable and scalable approach to chronic disease management.²⁶

AIMS

The primary aim for the study was to determine the feasibility of delivering a LMP to patients and staff in the Department of Diving and Hyperbaric Medicine, Royal Hobart Hospital. This included assessing participant acceptability, satisfaction, perceived value, and engagement (recruitment, retention, questionnaire completion, resource use, and session attendance), staff acceptability, and perspectives on workload and integration, and the practicality of inserting education sessions on the six pillars of LM, underpinned by motivational interviewing, into routine hyperbaric services (*[Supplement 1](#)).²⁵ The study assessed outcome measures from participants and staff, and recruitment strategies; evaluated the impact on service delivery; and supported development for future pilot trials for implementing LM into tertiary care contexts.²⁷

*Footnote: Supplement 1 is available online on our website: <https://www.dhmjournal.com/index.php/journals?id=435>

This study was informed by current knowledge and application of LM, implementation science, patient-centred care, and motivational interviewing. The predicted benefits were multi-layered. For patients, the LMP may improve recovery, quality of life, and self-management skills. With staff, the LMP offers tools and strategies to enhance wellbeing while providing holistic patient care, potentially reducing burnout. Regarding hospitals, the integration of LM supports innovation, aligns with broader health system goals (preventative healthcare, decreased disease burden, improved staff wellbeing), and may reduce long-term healthcare costs.

Methods

ETHICS

Dual ethics approval was obtained through the Tasmanian Low Risk Human Research Ethics Committee (2024/ETH02748) as the location for the study was at the Royal Hobart Hospital (RHH), and James Cook University Human Resource Ethics Committee (25H-0092) as the principal investigator's (PI's) Master's qualification was administered by the university. Governance was approved by the RHH Governance Committee.

STUDY DESIGN

This pilot program was conducted as a prospective, open label, non-controlled, non-randomised, small-scale clinical study, implemented over six weeks delivered alongside HBOT to evaluate operationalising a LMP for participants and staff. The six weeks aligned with the six pillars of LM topics, and an extra seventh week facilitated focus group attendance. A single LMP was provided to capture initial feasibility determinants. Data were sourced from a convenience sample of participants and staff using purpose-designed questionnaires, verbal commentary, and formalised focus groups. Quantitative and qualitative approaches were combined to capture measurable outcomes of feasibility (acceptability, demand, implementation, practicality, adaptation, integration and limited-efficacy testing) through metrics of enrolment, session attendance, retention, engagement, resource use, program delivery, participant satisfaction ratings, recommendation rates, perceived value, and safety to generate insights into suitability from participants and staff.²⁸ As a feasibility study, the sample size was not powered to detect intervention effectiveness. Quantitative outcomes are therefore reported descriptively, with percentages used to summarise feasibility rather than to support inferential or causal conclusions. The study framework was guided by LM principles, behaviour change theory (motivational interviewing), and implementation science concepts of feasibility.

The LMP was provided as a weekly group education and interactive discussion (six sessions, twice weekly, 30–40

minutes each) delivered in the department sub-waiting room prior to HBOT morning and afternoon chamber runs. LMP sessions were conducted by three HBOT staff, the PI (author EE) as the LM educator, a senior nurse/registrar as facilitator, and a nurse/registrar as scribe. Extra staffing was not required. The sessions were incorporated into patient care with the intent to minimally interrupt or inconvenience the running of the hyperbaric chamber or the participants' day (adding on an extra 20 minutes to patient contact time outside of standard care). Patients typically present 20–30 minutes prior to their daily HBOT to allow for changing out of street clothes into hyperbaric approved clothing, check in with nursing and medical staff to determine daily fitness for HBOT, and other individualised interventions (blood sugar level measurement, wound dressing change, etc).

Six weekly topics covered the six pillars of LM (nutrition, physical activity, enhancing sleep, decreasing stress, limiting addictive behaviours, and maintaining community connectedness), with delivery incorporating motivational interviewing techniques. Session notes captured by the scribe were summarised with supporting documentation by the PI into a weekly newsletter (printed or emailed to participants) to reinforce content and support accountability, building a LMP library.

PARTICIPANTS AND RECRUITMENT

Eligible participants were invited to attend the LMP via an opportunistic rolling recruitment prior to and during the study supported by poster advertisement in the department. Patients commenced and completed their hyperbaric treatment at different times during the trial, depending on timing of HBOT assessment, HBOT prescription (20–40 week-daily treatments), patient availability, hyperbaric chamber occupancy, and urgency of treatment. The individualised staggered start and cessation of HBOT for patients and their recruitment to the LMP was expected to impact on attendance rates (which was not a reflection of retention), therefore, attendance of the full program was unlikely. Given the chamber capacity (maximum six patients in the multiplace chamber and one patient in the monoplace chamber across two daily runs) and anticipated opt-out rates (~25%), sample size was also expected to be small during the six-week LMP feasibility study. Medical staff obtained written consent from participants on patient information and consent forms prior to engagement in the LMP with the option to withdraw from the study at any stage during the program without impacting their HBOT.

Eligibility criteria for the intervention included any patient commencing HBOT during the study period (six weeks) as many patients being referred for HBOT have multimorbid conditions. Exclusion criteria included age < 18 years, inability to consent (intubated patients), and a past or current history of eating and/or addiction disorders (as per low-risk ethics requirements). All attendees were from English speaking backgrounds.

QUESTIONNAIRE AND FOCUS GROUPS

All participants were asked to complete a feasibility questionnaire (responses were on a five-point Likert scale and short answers) following their completion of the program, regardless of number of sessions attended (*Appendix 1). A sample of 12 participants was targeted with a threshold for questionnaire completion, recruitment and retention set at 80% to support validation of the primary aim.²⁹ The participants who completed at least three of the six LMP sessions were deemed ‘completers’ of the program and were invited to the focus groups in week seven. This low attendance number criteria for completers anticipated the potential for attrition of participants during the program to ensure there would be eligible participants for the focus groups. Questionnaires and focus group questions were purpose-designed for this feasibility study, with the participant questionnaire adapted from the Food For Thought Questionnaire, 2015, provided through the Tasmanian Health Service’s Northern Integrated Care Service (*Appendix 1&3).³⁰ Survey items were tailored to the pilot objectives of feasibility as there was no established questionnaire available for this specific context (Appendix 1).

Open-ended interview questions in the two 25-minute focus groups conducted by the PI sought to determine the participants’ opinions as to which specific aspects of the LMP made it feasible, and what could be done for future iterations of the LMP (*Appendix 3). The focus groups were conducted 30 minutes prior to HBOT in week seven, to facilitate participant attendance. The focus group conversations were recorded by a Smartphone program and deleted following artificial intelligence transcription with the PI editing the transcription verbatim. The edited transcript was reviewed by co-author, JM. All results from questionnaires and focus groups were deidentified and recorded in the Department of Health Research Electronic Data Capture (REDCap) as per ethics requirements.

STAFF AND RECRUITMENT

Department of Diving and Hyperbaric Medicine staff fulfilled the roles in the LMP sessions including the LM educator (PI and hyperbaric consultant), facilitator (senior nurse/registrar), and scribe (nurse/registrar). The PI held dual roles as the LM educator and researcher as this was their capstone project to achieve a Masters in Lifestyle Medicine. Staff were proactively recruited by the PI depending on availability, providing their verbal consent with their roles clearly outlined. All department staff involved directly (provision or support of the LMP) or indirectly (supervision of HBOT) with the LMP were asked to complete the staff purpose-designed questionnaire (five-point Likert scale and short answers) at completion of the LMP to obtain a broader scope of interdepartmental acceptance of the

LMP (*Appendix 2). Staff HBOT employment (doctor, nurse, technician, administration) varied from < 1 year to > 30 years, with no prior LM experience. A threshold of 80% was prospectively set for staff feasibility measured as acceptability, alignment of the LMP with the Organisation’s values, and future recommendation of patient participation by staff determined through the questionnaire (*Appendix 2).

DATA ANALYSIS

Feasibility was evaluated through quantitative metrics such as recruitment and retention of participants, and satisfaction and recommendation rates, analysed descriptively and reported as percentages.²⁸ Qualitative responses (short answers and focus group transcripts) employed inductive thematic analysis, guided by Braun and Clarke’s six-phase framework.³¹ The PI immersed themselves in the raw data from participant short answers and focus groups, and the staff short answers, seeking a critical appraisal of the dataset. This helped initial data coding and theme development as they emerged from the raw data through a process of highlighting text and determining codes by repeated comments and salient points from respondents.³² These codes were then analysed to find broader patterns of commonality to support evolution of themes to describe what emerged out of the dataset. Themes were further refined using reflexive journaling and a thematic map.³² The final thematic analysis involved evolution of the themes and subthemes to ensure capture of nuanced perspectives provided by the responders, supported by illustrative quotes. As the themes for the participant short answers and focus groups were well aligned, they were combined for the qualitative assessment. This process implemented reflexivity throughout the six phases, which was then reviewed by co-author JM for validity of participant and staff feedback into the thematic constructs to restrict PI bias.^{32,33} This mixed-methods approach attempted to capture both measurable feasibility outcomes and rich, contextual insights into acceptability through convergent parallel analysis for the small sample size. Questionnaires and focus group questions could be further refined in designing future pilot trials to help validate the assessment tools.

COST ANALYSIS

Cost of implementing a LMP was provided as ‘time in kind’ with staff, expertise, and resources all sourced within the department and provided alongside standard patient care. The PI allocated two hours per week to prepare and conduct the LMP sessions, document, and electronically distribute the weekly newsletter to support consolidation of information from the group education and discussion session. Newsletters were formulated from key learning objectives for each pillar and conversational points from participants supported by factual information that arose during the education and discussion session. The educational

*Footnote: Appendices 1–3 are available online on our website: <https://www.dhmjournal.com/index.php/journals?id=436>

framework and information guide based on the six pillars of LM was formulated as part of the ethics application. The framework, guides, and newsletters established a LMP library for future use. Staff involvement was within normal working hours (for up to 40 minutes per session, twice weekly), with no significant increase in duties and minimal preparation required for the program. The total additional hours allocated to the LMP for all staff involved in the program was approximately 5.5 hours per week during normal working hours (divided among the PI, facilitator, and scribe). Participants might have been out-of-pocket for a small increase in vehicle parking fees. No extra funding was sought for the program.

Results

RECRUITMENT AND RETENTION

Fourteen patients were eligible for the LMP alongside their HBOT during the recruitment period with 12 participants consented to the program, achieving the goal of 12 participants for this small feasibility study (recruitment was > 80%) (Figure 1). The two other eligible patients declined consent to be involved in the LMP. No-one withdrew their consent for participation during the program (retention was successful at > 80%).²⁹ LMP attendance was 100% despite varied HBOT commencement and cessation dates amongst participants (Table 2). One participant did not complete the questionnaire due to unplanned cessation of HBOT and was unable to be contacted. Their data are not included in the results. Six participants attended three or more sessions ('completers') during their HBOT, with two completing the full six sessions. Four out of six 'completers' attended the two focus groups held prior to HBOT facilitated

by the PI. One 'completer' was unavailable due to work commitments and the other was travelling interstate. Ten participants were receiving HBOT for latent effects of soft tissue radiation (predominantly radiation cystitis), and two had complications of a diabetic foot ulcer (both conditions typically receive 40 HBOT sessions). Seventeen staff completed questionnaires, ten medical and nursing staff directly involved in the provision of the LMP (59%) and seven medical, nursing, technical and administrative staff not directly involved in the program (41%) but had regular participant contact during the LMP (Table 3).

QUANTITATIVE OUTCOMES

Participants

Of the 11 respondents (out of 12 consented participants), seven were male (64%, 75–83 years old) and four were female (36%, 64–69 years old). All resided in socioeconomically advantaged areas (Socio-Economic Indexes for Areas quintiles 4–5).³⁴ Acceptability was high (11/11, 100%), with 10 participants (91%) finding the LMP beneficial, nine (82%) reporting improved understanding of health behaviours, and 10 (91%) valued the newsletters (Table 4). In fact, all participants requested newsletters for topics that they had missed the education sessions for both prospectively and retrospectively. While all sessions were rated as relevant, application of knowledge to daily life varied (Table 4). However, four participants (36%) reported feeling unsupported by the facilitators, and two participants (18%) felt unsupported and uncomfortable contributing to the education sessions (Table 4). Three participants (27%) also felt they didn't receive enough information prior to joining the LMP (Table 4). Yet, eight participants (73%) expressed

Figure 1
Overview of participants and attendance

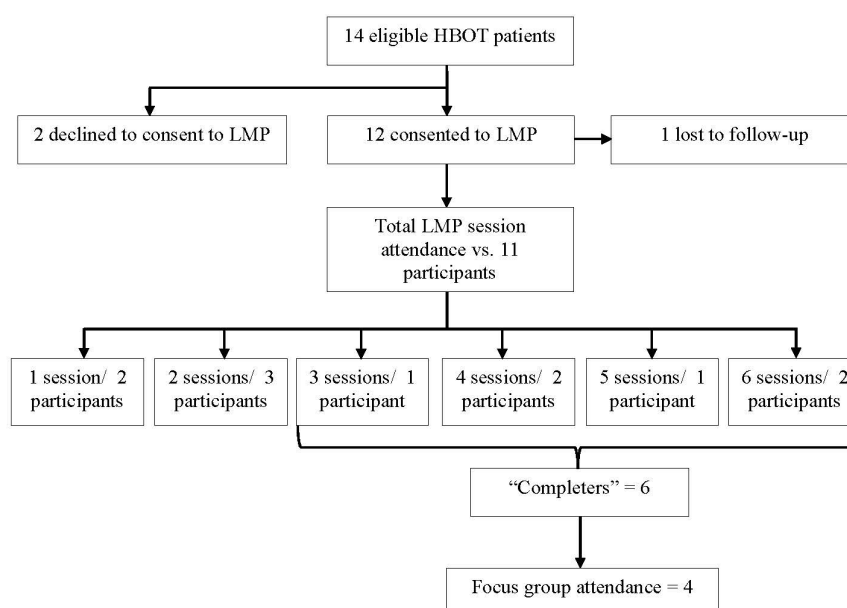


Table 2
Characteristics of participant attendance

Week	Topic	Participant attendance
1	Nutrition	6
2	Physical activity	8
3	Sleep	7
4	Stress management	5
5	Addressing addiction	5
6	Enhancing community	5

interest in further programs, with three participants (27%) neutral (Table 5). All participants would recommend the LMP (Table 4).

Staff

Staff also rated the LMP highly with 17/17 (100%) reporting acceptability and alignment with the organisations' values and mission (Table 5). The utility of the LMP effectively addressing patient needs was also high, which was reflected in the likelihood of staff recommending the program to patients (Table 5).

QUALITATIVE OUTCOMES

Participants

Coding participant verbal feedback and triangulation with short answer responses via thematic analysis resulted in five overarching themes with subthemes (Table 6). Participants generally valued the LMP integrated into their hyperbaric treatment, finding the information, social support and connection as beneficial for their health and wellbeing (Table 6). However, they did struggle with the perceived connection of the LMP to hyperbaric therapy, highlighting the need for clarity with program framing and communication (Table 6). The social connection and shared experiences emerged as core components to the success of the LMP (Table 6). Reflexively, the PI's positive priming during the focus groups may have shaped participant responses, shifting the conversation toward affirmation as opposed to critique. Thematically, this analysis provides recommendations for improved transparency, structure, and therapeutic alliance with implementing a LMP within hospital-based care.

Staff

Thematic analysis for staff short answers from the questionnaire revealed four themes with descriptors regarding their perspective of the implementation of the LMP into the Department of Diving and Hyperbaric Medicine (Table 7). From a reflexive perspective, the staff data analysis indicated that the LMP was well-received and feasible

Table 3
Characteristics of staff in the lifestyle medicine program (LMP)

Occupation	n (%)
Doctor	4 (23%)
Nurse	9 (53%)
Technician	3 (18%)
Administration	1 (6%)
Total	17
Involvement in the LMP	
Yes	10 (59%)
No	7 (41%)

with workflow, identifying strong participant engagement and staff enthusiasm as enablers, while barriers included participant readiness, scheduling and access constraints, with suggestions for improved timing, pre-intervention information, and multidisciplinary input to strengthen future implementation (Table 7). The inductive interpretation of the dataset captures the intrinsic alignment between LM's principles (prevention, empowerment, behaviour change) and the department's culture of patient-centred, holistic care.^{11,14}

Discussion

These results suggest that integrating a LMP into standard HBOT care was feasible for participants and staff within this small and intimate hyperbaric setting. Feasibility metrics of acceptability, demand, implementation, practicality, integration and limited-efficacy testing were achieved through high attendance and the absence of withdrawals, plus participant and staff appreciation for LMP structure and resources (particularly newsletters). Both groups also reported strong satisfaction with the LMP and willingness to recommend the program. The need to provide adequate explanation for the intent and purpose of the LMP with onboarding, clearer framing of the LMP-HBOT relationship and checking in during the discussions to ensure understanding and clarity were identified by both participants and staff. This could reduce the risk of participants feeling unsupported and uncomfortable during the group sessions, allowing for a more supportive, sharing environment (Table 4). Future studies could incorporate participant assessment of readiness for behavioural change to strengthen study design and success. Both parties provided support and recommendations for future implementation of the program in the department.

As the first study of its kind, this feasibility study addresses a gap in the literature and aligns with national health priorities. Regular HBOT attendance appeared to facilitate program delivery, while the mixed-methods design enabled a broader understanding of both quantitative viability information and qualitative suitability insights from participants and staff. While the PI was the only staff member trained in LM, there

Table 4
Results of the participant questionnaire; LMP – lifestyle medicine program

Question	n (%)					
	Strongly agree	Agree	Neutral	Disagree	Strongly disagree	No response
Overall, I had benefit from the LMP	4 (36%)	6 (55%)	–	–	–	1 (9%)
Overall, the LMP was acceptable	3 (27%)	8 (73%)	–	–	–	–
I have a better understanding of how I can improve my health and wellbeing	5 (46%)	4 (36%)	2 (18%)	–	–	–
I found the weekly structure and content of the LMP to be helpful	2 (18%)	7 (64%)	–	–	–	2 (18%)
I found the weekly newsletter/readings/resources to be helpful	4 (36%)	6 (55%)	–	–	–	1 (9%)
I found the setting in which the LMP was provided to be appropriate	5 (45%)	5 (45%)	–	–	–	1 (10%)
I felt that I didn't receive enough information about the program and my role in it before starting the LMP	2 (18%)	1 (9%)	1 (9%)	6 (55%)	–	1 (9%)
I have no regrets about taking part in the LMP	7 (64%)	4 (36%)	–	–	–	–
I felt unsupported and uncomfortable sharing my views and experiences during the education and discussion sessions in the LMP	–	2 (18%)	2 (18%)	4 (36%)	3 (28%)	–
I felt unsupported by facilitators	1 (9%)	3 (27%)	–	4 (36%)	3 (28%)	–
I would recommend the LMP to other people	4 (36%)	7 (64%)	–	–	–	–
If given the opportunity, I would do more LMPs	3 (27%)	5 (46%)	3 (27%)	–	–	–
I have made/am making change in my daily life because of what I learned in the LMP	3 (27%)	5 (46%)	2 (18%)	1 (9%)	–	–
I found the nutritional content to be helpful and relevant (6/11 participants)	2 (33%)	3 (50%)	1 (17%)	–	–	–
I found the physical activity content to be helpful and relevant (8/11 participants)	3 (38%)	5 (62%)	–	–	–	–
I found the stress management content to be helpful and relevant (5/11 participants)	1 (20%)	4 (80%)	–	–	–	–
I found the sleep optimisation content to be helpful and relevant (7/11 participants)	3 (43%)	4 (57%)	–	–	–	–
I found the addressing addictive behaviours content to be helpful and relevant (5/11 participants)	1 (20%)	2 (40%)	2 (40%)	–	–	–
I found the enhancing community connectedness content to be helpful and relevant (5/11 participants)	2 (40%)	2 (40%)	–	–	–	1 (20%)

are educational opportunities in the form of an e-learning module and workshops (< 60 minutes duration) provided by the Tasmanian Health Service on the Six Pillars of Wellbeing designed to enhance staff knowledge and expertise within the LM realm. Support of staff with accessible and affordable inhouse training could promote multiplication of sustainable leadership with provision of LM education and discussion sessions.

The combination of education sessions and newsletters appeared to offer a practical, low-cost intervention model that can be adapted across clinical settings. Health-literate newsletters could be further developed for pre- and post-session resources, translated for diverse cultural and language backgrounds, and supplemented with digital tools. This could further enhance reinforcement of learning aims and accountability for participants and support staff

Table 5
Results of the staff questionnaire; LMP – lifestyle medicine programme

Question	n (%)				
	Very acceptable/ Aligned/ Effective/ Likely	Acceptable/ Aligned/ Effective/ Likely	Neutral	Unacceptable/ Misaligned/ Ineffective/ Unlikely	Very unacceptable/ Misaligned/ Ineffective/ Unlikely
Rate your overall acceptability of the LMP	12 (71%)	5 (29%)	–	–	–
Does the LMP align with our organisations values and mission?	16 (94%)	1 (6%)	–	–	–
How effective do you think the programme is in addressing patient needs?	9 (52%)	8 (48%)	–	–	–
How likely are you to recommend the programme to patients?	13 (76%)	4 (24%)	–	–	–

familiarisation of education topics. Further clarification of optimising patient access to such resources needs to be explored in future research, particularly considering the existing high workload on healthcare professionals.

Future research could also consider a hybrid model tailored to patient access and needs for virtual (e.g. video vignettes, online resources) and face-to-face integration of education. The model needs to align with participant and staff recommendations to preserve interpersonal benefits and motivational interviewing from face-to-face sessions. This can assist with addressing issues regarding the setting, patient transport, and staffing fluctuations around departmental demands.

LIMITATIONS

There were several limitations with this study. The small sample size and single-site design limit transferability and generalisability of the findings and restrict the ability to draw causal inferences. Health characteristics beyond their HBOT indication of the participants were not obtained due to ethics restrictions, limiting applicability of the LMP to patients with multimorbidity and polypharmacy. Percentages reported should be interpreted with caution due to low absolute numbers. While opportunistic rolling recruitment provided pragmatic implementation and created variability in participant exposure to the full program, this may have introduced selection bias and limited diversity within the sample.

The consent process could also be improved with pre-information patient resources (brochure, website). The short duration of the study and lack of follow-up also limits the assessment of longer-term implementation sustainability, scalability and real-world impact.

All participants were English speaking and resided in areas of relative socioeconomic advantage resulting in lack of heterogeneity of participants and restricting interpretation

of results to disadvantaged groups.³⁴ This substantially limits applicability of this study, particularly as LM interventions aim to address inequities among disadvantaged populations who have the greatest burden of multimorbidity and constitute the greatest proportion of the population in Tasmania.³⁴ This generalisability gap in the recruitment impacts on the interpretation of feasibility of the study amongst all patients referred for HBOT, further highlighting equity and health literacy deficits in the provision of healthcare nationally.

Potential researcher bias in data collection and interpretation is another consideration, as the PI held dual roles as the LM educator and researcher. This may have influenced participant engagement and interpretation of qualitative data despite efforts to minimise bias irrespective of peer review. Feedback from staff, while valuable, may have been influenced by departmental culture as opposed to organisational or universal feasibility. There is also acknowledgement for professional alignment with the PI for staff responses. The small size of the department, intimate social relationship between staff, participants, and the PI, and the level of socioeconomic advantage of the cohort could have also lent itself to social desirability bias. Efforts were made to minimise bias through recruitment strategies, structured facilitation, use of independent questionnaires, and reflexive, systematic thematic analysis with co-author oversight. As the PI was the only trained LM practitioner in the department this is also a limitation in that there is a risk of lack of quality control and continuity for the provision of LMP across staff involved in the LMP.

This feasibility study could be further expanded into a pilot trial to determine and further elaborate on feasibility metrics with implementing a LMP into standard HBOT care. The limitations could also be addressed with enrolling more participants, providing multiple iterations of the program, creating multi-site designs, extended trial period, expansion on delegation of roles including triangulation, independent facilitation of qualitative data collection, targeted strategies

Table 6

Thematic analysis of participant short answers and focus groups; FG – focus group; HBOT – hyperbaric oxygen treatment; SA – short answer

Themes	Subthemes	Illustrative quotes
Social connection and peer support with learning	Social sharing	<i>"It breaks down those barriers a little bit for chatting around the subjects."</i> (Female, FG) <i>"Everyone seemed engaged and happy to share."</i> (Female, SA)
	Lived shared experience	<i>"It gets you through to talk about your condition... connection helped me through mine"</i> (Male, FG) <i>"People build such good relationships because you've got the time and you've got that shared experience."</i> (Male, FG)
	Therapeutic relationships	<i>"Lifestyle, nutrition for prevention of disease would be a really good thing for doctors to be able to teach patients."</i> (Female, short answer) <i>"The friendly, convivial attitude of staff is infectious."</i> (Male, SA)
Interpersonal and social aspects of learning	Delivery preferences	<i>"Excellent presentations of invaluable information."</i> (Female, SA) <i>"In those group sessions, there's always someone who wants to talk."</i> (Male, FG) <i>"I received helpful newsletters on some of the sessions I missed."</i> (Female, SA)
	Enhanced wellbeing and coping	<i>"Before I started, there was a lot of pain...there's no pain anymore."</i> (Male, FG) <i>"There's been lots of health concerns....it helped me to cope with that."</i> (Male, FG)
Participant engagement and knowledge development	Empowerment	<i>"I'm reading up on it now to see what else I can do."</i> (Male, FG)
	Self-directed learning	<i>"Manageable goals/ways of implementing."</i> (Female, SA)
	Information load	<i>"I tuned out for quite a bit of it."</i> (Male, FG) <i>"Very, very foreign topics."</i> (Male, FG)
	Educational accessibility	<i>"Sessions informative and some very helpful information shared... helpful newsletters."</i> (Female, SA) <i>"Advantageous to have your summarise given to us first."</i> (Male, FG)
Perceived relevance and integration	Variable usefulness	<i>"Better clarification about what was involved in the program."</i> (Male, FG) <i>"I found it a tad difficult."</i> (Male, FG) <i>"Presentations were aimed at the correct level."</i> (Female, SA)
	Relevance with HBOT	<i>"I don't know what connection there is with hyperbaric."</i> (Male, FG)
	Personalisation of information	<i>"I think that sort of information is good for everyone... a general holistic approach."</i> (Female, FG) <i>"Because that list that you showed me, that was of interest. I didn't know I was committing to a six-week session."</i> (Male, FG)
Program delivery, timing and logistical considerations	Multimodal delivery	<i>"The printed information sent by email is invaluable, because you have time to absorb it."</i> (Male, SA) <i>"Face to Face is better for discussions."</i> (Female, SA)
	Timing	<i>"Timing worked out pretty well... that was fortunate."</i> (Male, FG) <i>"It would be good to know what days this was going to happen so you can make arrangements."</i> (Female, FG)
	Accessibility barriers	<i>"I couldn't hear it properly."</i> (Male, FG) <i>"That works if you're driving, that doesn't work so much if you're relying on other people for transport."</i> (Female, SA)

Table 7
Thematic analysis of staff short answers; HBOT – hyperbaric oxygen

Themes	Subthemes	Illustrative quotes
Departmental workflow and logistical implications	Service flow Scheduling	<i>“Didn’t interrupt the flow of the unit.”</i> (Technician) <i>“Early timing incompatible with some, especially for community transport”</i> (Doctor)
	Adequate staffing	<i>“Timing can be tight for nurses in organising other patients.”</i> (Nurse)
	Spatial configuration	<i>“Doing the sessions in a difference space from the waiting area to psychologically separate the program from ‘waiting for HBOT’.”</i> (Doctor)
Patient preparedness and readiness for behaviour change	Targeted recruitment	<i>“Potential patients could be identified and sent information brochures prior to assessment.”</i> (Doctor)
	Variable readiness	<i>“One or two patients would not consider... not willing to change”</i> (Nurse) <i>“Some patients pre-contemplative.”</i> (Doctor) <i>“Patients very, very engaging”</i> (Technician) <i>“The program was received very well from our patients.”</i> (Administration)
Communication and education resources	Effective communication	<i>“Receiving the weekly newsletter with the resources that are sent to the participants.”</i> (Nurse) <i>“Perhaps a brochure if it does become permanent”</i> (Doctor)
	Staff awareness	<i>“So staff can keep abreast of what is being discussed with patients and learn too!”</i> (Nurse)
	Access to materials	<i>“A website patients can visit.”</i> (Technician)
Future implementation and integration	Staff optimism	<i>“I really enjoyed participating.”</i> (Nurse) <i>“A great program, well received by patients and staff alike.”</i> (Technician)
	Continuation	<i>“I’d be happy to be involved with this again.”</i> (Nurse) <i>“Hoping it continues”</i> (Nurse)
	Multidisciplinary inclusion	<i>“Maybe input from other specialties, e.g. nutritionists, physiotherapists.”</i> (Nurse)

to engage socioeconomically disadvantaged participants, and staff education in the field of LM. Outcomes can target inclusivity, validation of assessment tools (to measure pre-program population profile against post-program content retention/learnings), patient-reported outcomes in the short and long-term, staff satisfaction, sustained behaviour change, and cost-effectiveness to inform scalability of LMPs in clinical care.

Conclusions

This feasibility study demonstrated that integrating a LMP alongside HBOT can be feasible, where resources are available for English speaking and socioeconomically advantaged patients and staff in a small hyperbaric department in a tertiary hospital setting potentially improving preventative health behaviours, wellbeing, and patient and staff satisfaction. Education sessions supported

by newsletters provided a practical, potentially low-cost, and well-received model that fostered collegiality, enhanced coping strategies, and promoted self-agency. Staff recognised the program’s alignment with organisational values and its potential to complement HBOT without disrupting service delivery. Limitations, including small sample size, single-site design, and participant socioeconomic homogeneity, restricted generalisability. Future research could build on these findings through a pilot trial with a larger sample size conducted over a longer duration to address equity gaps, optimise integration into standard patient care and resource delivery, and evaluate longer-term outcomes such as behaviour change, patient-reported health outcomes (including morbidity and mortality metrics), and cost-effectiveness. This study provides a foundation for extending LM into hospital-based care, with relevance for chronic disease management across hyperbaric and other tertiary settings.

References

- Aramrat C, Choksomngram Y, Jiraporncharoen W, Wiwatkunupakarn N, Pinyopornpanish K, Carson Mallinson PA, et al. Advancing multimorbidity management in primary care: A narrative review. *Prim Health Care Res Dev.* 2022; 23:e36. doi: 10.1017/S1463423622000238. PMID: 35775363. PMID: PMC9309754.
- Australian Institute of Health and Welfare. Multimorbidity. AIHW, Australian Government. 2024. [cited 2024 Oct 23]. Available from: <https://www.aihw.gov.au/reports/australias-health/multimorbidity>.
- Masnoon N, Shakib S, Kalisch-Ellett L, Caughey GE. What is polypharmacy? A systematic review of definitions. *BMC Geriatr.* 2017;17:230. doi: 10.1186/s12877-017-0621-2. PMID: 29017448. PMID: PMC5635569.
- Srivastava SB. Polypharmacy, unintended consequences, and impact of lifestyle medicine. *Am J Lifestyle Med.* 2023;18:54–7. doi: 10.1177/15598276231207302. PMID: 39184275. PMID: PMC11339771.
- Sethuraman KN, Smolin R, Henry S. Is there a place for hyperbaric oxygen therapy? *Adv Surg.* 2022;56:169–204. doi: 10.1016/j.yasu.2022.02.011. PMID: 36096567.
- Australian Bureau of Statistics. National, state and territory population. Canberra: ABS; 2025. [cited 2026 Jan 14]. Available from: <https://www.abs.gov.au/statistics/people/population/national-state-and-territory-population/latest-release>.
- Simman R, Mihani A, Michalak J, Heyboer M. Pearls in hyperbaric oxygen therapy: a challenging case series. *Wounds.* 2022;34(9):E78–E84. doi: 10.25270/wnds/21049. PMID: 36252269.
- MacInnes L, Baines C, Bishop A, Ford K. Patient knowledge and experience of hyperbaric oxygen treatment. *Diving Hyperb Med.* 2021;51:72–7. doi: 10.28920/dhm51.1.72-77. PMID: 33761544. PMID: PMC8313768.
- Teguh DN, Bol Raap R, Koole A, Knippenberg B, Smit C, Oomen J, van Hulst RA. Hyperbaric oxygen therapy for nonhealing wounds: Treatment results of a single center. *Wound Repair Regen.* 2021;29:254–60. doi: 10.1111/wrr.12884. PMID: 33377598. PMID: PMC7986203.
- Howell RS, Criscitelli T, Woods JS, Gillette BM, Gorenstein S. Hyperbaric oxygen therapy: Indications, contraindications, and use at a tertiary care center. *AORN J.* 2018;107:442–53. doi: 10.1002/aorn.12097.
- Babich JS, McMacken M, Correa L, Polito-Moller K, Chen K, Adams E, et al. Advancing lifestyle medicine in New York City's public health care system. *Mayo Clin Proc Innov Qual Outcomes.* 2024;8:279–92. doi: 10.1016/j.mayocpiqo.2024.01.005. PMID: 38828080. PMID: PMC11141270.
- Bodai BI, Nakata TE, Wong WT, Clark DR, Lawenda S, Tsou C, et al. Lifestyle medicine: A brief review of its dramatic impact on health and survival. *Perm J.* 2018;22:17–25. doi: 10.7812/TPP/17-025. PMID: 29035175. PMID: PMC5638636.
- Egger GJ, Binns AF, Rossner SR. The emergence of “lifestyle medicine” as a structured approach for management of chronic disease. *Med J Aust.* 2009;190:143–5. doi: 10.5694/j.1326-5377.2009.tb02317.x. PMID: 19203313.
- Egger G, Egger S. Lifestyle medicine: The Australian experience. *Am J Lifestyle Med.* 2012;6:26–30. doi: 10.1177/1559827611405287.
- Egger G. Lifestyle medicine: The ‘why’, ‘what’, and ‘how’ of a developing discipline. *Aust J Gen Pract.* 2019;48:665–8. doi: 10.31128/AJGP-06-19-4955. PMID: 31569327.
- Fields D, Arnold M, Karlsen M, Kelly J. A lifestyle medicine approach to medication deprescribing: An introduction. *J Fam Pract.* 2022;71(1):E100–4. doi: 10.12788/jfp.0259. PMID: 35389855.
- Merlo G, Rippe J. Physician burnout: A lifestyle medicine perspective. *Am J Lifestyle Med.* 2021;15:148–57. doi: 10.1177/1559827620980420. PMID: 33790702. PMID: PMC7958216.
- Patel P, Madrid M. Successfully integrating lifestyle medicine into health systems. *Am J Lifestyle Med.* 2021;15:510–13. doi: 10.1177/15598276211008397. PMID: 34646099. PMID: PMC8504335.
- Petersen MR, Freeman AM, Madrid M, Aggarwal M. Strategies for incorporating lifestyle medicine in everyday hospital practice. *Am J Lifestyle Med.* 2021;15:531–7. doi: 10.1177/15598276211006664. PMID: 34646102. PMID: PMC8504330.
- Sun X, Feng X, Hu S. Lifestyle medicine in China: The Fuwai Hospital lifestyle medicine initiative. *Am J Lifestyle Med.* 2025;20(1):15598276251371687. doi: 10.1177/15598276251371687. PMID: 40895502. PMID: PMC12394202.
- Yeoh EK, Wond MCS, Wong ELY, Yam C, Poon CM, Chung RY, et al. Benefits and limitations of implementing chronic care model (CCM) in primary care programs: A systematic review. *Int J Cardiol.* 2018;258:279–88. doi: 10.1016/j.ijcard.2017.11.057. PMID: 29544944.
- Egger G, Binns A, Rössner S, Sagner M, editors. *Lifestyle medicine: lifestyle, the environment and preventive medicine in health and disease*, 3rd ed. London: Academic Press; 2017.
- Lippman D, Stump M, Veazey E, Tanigawa Guimarães S, Rosenfeld R, Kelly JH, et al. Foundations of lifestyle medicine and its evolution. *Mayo Clin Proc Innov Qual Outcomes.* 2024;8:97–111. doi: 10.1016/j.mayocpiqo.2023.11.004. PMID: 38304165. PMID: PMC10831813.
- Kamarajah SK, Lampridou S, Soysa ND, Glasbey JC, Nepogodiev D, Blackwell S, et al. Implementation of hospital-initiated complex interventions for adult people with multiple long-term conditions: a scoping review. *BMC Health Serv Res.* 2025;25:290. doi: 10.1186/s12913-025-12424-2. PMID: 39980012. PMID: PMC11843763.
- Bowen DJ, Kreuter M, Spring B, Cofta-Woerpel L, Linnan L, Weiner D, et al. How we design feasibility studies. *Am J Prev Med.* 2009;36:452–7. doi: 10.1016/j.amepre.2009.02.002. PMID: 19362699. PMID: PMC2859314.
- Australian Government, Department of Health. National preventive health strategy 2021–2030. 2021. [cited 2024 Nov 9]. Available from: https://www.health.gov.au/sites/default/files/documents/2021/12/national-preventive-health-strategy-2021-2030_1.pdf.
- Eldridge SM, Chan CL, Campbell MJ, Bond CM, Hopewell S, Thabane L, et al. on behalf of the PAFS consensus group. CONSORT 2010 statement: extension to randomised pilot and feasibility trials. *BMJ.* 2016;355:i5239. doi: 10.1136/bmj.i5239. PMID: 27777223. PMID: PMC5076380.
- Aschbrenner KA, Kruse G, Gallo JJ, Plano Clark VL. Applying mixed methods to pilot feasibility studies to inform intervention trials. *Pilot Feasibility Stud.* 2022;8(1):217. doi: 10.1186/s40814-022-01178-x. PMID: 36163045. PMID: PMC9511762.
- Montgomery R. Sample size justification in feasibility studies:

- moving beyond published guidance. Pilot Feasibility Stud. 2025;11(1):88. doi: [10.1186/s40814-025-01675-9](https://doi.org/10.1186/s40814-025-01675-9). PMID: [40551266](https://pubmed.ncbi.nlm.nih.gov/40551266/). PMCID: [PMC12186404](https://pubmed.ncbi.nlm.nih.gov/PMC12186404/).
- 30 Ogden K, Woodroffe J, Mercer J. 'Food for thought': Implementation and development of a new interdisciplinary clinical pathway for obesity management in Tasmania. A demonstration project of the vTAHSP 2014–2015. University of Tasmania, Tasmania. 2015 (Final report – Government Research).
 - 31 Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3:77–101. doi: [10.1191/1478088706qp063oa](https://doi.org/10.1191/1478088706qp063oa).
 - 32 Ahmed SK, Mohammed RA, Nashwan AJ, Ibrahim RH, Abdalla AQ, Ameen BMM, et al. Using thematic analysis in qualitative research. J Med Surg Public Health. 2025;6:100198. doi: [10.1016/j.glmedi.2025.100198](https://doi.org/10.1016/j.glmedi.2025.100198).
 - 33 Ogden K, Barr J, Rossetto G, Mercer J. A “messy ball of wool”: a qualitative study of the dimensions of the lived experience of obesity. BMC Psychol. 2020;8(1):67. doi: [10.1186/s40359-020-00416-2](https://doi.org/10.1186/s40359-020-00416-2). PMID: [32586401](https://pubmed.ncbi.nlm.nih.gov/32586401/). PMCID: [PMC7318440](https://pubmed.ncbi.nlm.nih.gov/PMC7318440/).
 - 34 Australian Bureau of Statistics (ABS). Socio-economic advantage and disadvantage. Cat. No. 2071.0 – Reflecting Australia: Stories from the Census, 2016. 2017. [cited 2025 Jul 27]. Available from: <https://www.abs.gov.au/ausstats/>

abs@.nsf/Lookup/by%20Subject/2071.0~2016~Main%20Features~Socio-Economic%20Advantage%20and%20Disadvantage~123#:~:text=SEIFA%20quintiles%20are%20based%20on,.gov.au/census.

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