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Development of a Visualised Palliative Care Programme Based on Watson’s Theory and Its Evaluation Using the RE-AIM Framework

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[Abstract] Objective: To develop a visualised humanistic care programme based on Watson’s theory of humanistic nursing and to evaluate its effectiveness using the RE-AIM framework.**Methods:** A total of 98 palliative care patients were enrolled. The control group (n = 49) received standard care, while the intervention group (n=49) received the visualisation programme (Five Senses Palliative Care Room, ‘Scroll of Life’ VR Dignity Therapy, and ‘Tree of Life’ Narrative Care) alongside standard care for 12 days.Outcomes were assessed using the Edmonton Symptom Assessment Scale (ESAS), the Dignity Scale (PDI), the Visualised Humanistic Care Practice Evaluation, and a satisfaction questionnaire. **Results:** Following the intervention, the intervention group’s total ESAS score (35.18±5.38) was lower than that of the control group (41.47±6.22);the total PDI score (51.53±8.87) was also lower than that of the control group (58.47±9.78), Satisfaction levels at the immediate, follow-up, and at the 1- and 3-month follow-ups, were all superior to those of the control group (all P< 0.05). **Conclusion:** This programme effectively alleviates symptoms, upholds dignity and enhances satisfaction, The RE-AIM framework ensures the quality and sustainability of its implementation.

[Keywords] Watson’s Humanistic Care Theory; humanistic care; palliative care; visualisation; RE-AIM framework

Trial registration

Chinese Clinical Trial Registry, ChiCTR2026672999. Registered on October 13th, 2026–Retrospectively registered.

With the acceleration of population ageing in China, the demand for palliative care has grown significantly. A holistic care model provides integrated physical, psychological and spiritual services to patients at the end of life, alleviating multiple forms of suffering while upholding dignity [1]. Humanistic care is aligned with the philosophy of palliative care and aims to improve quality of life in the terminal phase through professional practice [2]. However, existing visualisation practices in humanistic care tend to focus on single-sensory stimulation and lack innovative approaches that systematically integrate multiple sensory channels to provide deeply immersive experiences and offer structured implementation pathways. Guided by the principles of Watson's humanistic care theory, this study has developed three major visualisation schemes:

1. 'Five Senses Palliative Care Room': This creates a supportive environment through multisensory stimulation. Combined with emotional expression, it transforms abstract care experiences into tangible, perceptible ones. 2. 'Scroll of Life' VR Dignity Therapy: utilising

immersive scenarios to facilitate the expression of existential meaning, thereby transcending the limitations of purely verbal communication. 3. ‘Tree of Life’ Narrative Care: visually externalising life stories to cultivate patients’ self-awareness and reconstruct their perception of illness.The implementation of the scientific RE-AIM framework, which encompasses the five dimensions of coverage, effectiveness, acceptability, fidelity and sustainability, enables a comprehensive evaluation of the clinical translation of complex interventions [3]. Guided by Watson’s theory, this study designed multisensory visualisation programmes and applied the RE-AIM framework for the first time to evaluate the process and outcomes of palliative care practice. The aim was to provide evidence-based support for standardised implementation.

1 Materials and methods

1.1General data

A cluster sampling method was employed to select patients admitted to the palliative care ward of our hospital between September 2025 and May 2026 as the study subjects. The inclusion criteria were: ①Patients with terminal illnesses admitted to the palliative care ward; ② Expected survival of 2–6 months;③Patients who provided informed consent to participate in this study. Exclusion criteria: patients with severe cognitive impairment or those in a critical condition unable to cooperate. Exclusion criteria: ①voluntary withdrawal or an active request to withdraw from the study; ②patient death, transfer to another department, discharge or transfer to another hospital during the intervention period; ③incomplete data rendering statistical analysis impossible.

Based on the formula for comparing the means of two samples: $n1 = n2 = 2\times[(Z_{\alpha} + Z_{\beta})\times \sigma / \delta]^2$, where σ is the population standard deviation and δ is the difference between the two means. A pilot study was conducted with 10 patients using the Edmonton Symptom Assessment Scale as the primary outcome measure. Following the pilot study, the intervention group's scale score was 37.60±8.97 points, which the control group's score was 44.80±9.53 points. This yielded δ = 9.49 and σ = 7.20. The required sample size for each group was calculated to be 37. However, to allow for a 10 per cent dropout rate, the minimum sample size per group was set at 41. This resulted in a total sample size of 82. To prevent cross-contamination between groups, the palliative care ward was divided into Wards 1 and 2, ensuring physical separation. Fifty patients admitted to Ward 1 were assigned to the intervention group and 50 patients admitted to Ward 2 were assigned to the control group. Due to uncontrollable factors, one patient dropped out of the intervention group and one from the control group. A comparison of the general characteristics of the two groups is shown in Table 1.

Table 1 Comparison of general characteristics between the two groups

Group	n	Gender (cases)		Age	Educational Attainment			
		Male	Female	(years, $\bar{X}\pm s$)	Primary school and below	Lower secondary	Upper secondary	University and above
Control group	49	24	25	64.61±10.33	16	18	10	5
Intervention group	49	23	26	66.08 ± 10.51	22	15	8	4
χ^2/T value		χ^2 = 0.041		T = -0.698	χ^2 = 1.076			
P-value		0.840		0.886	0.300			

Group	n	Marital status (e.g.)		Health insurance payment method			
		Married	Unmarried/Divorced/Widowed	Employee health insurance	Resident health insurance	Private insurance	Out-of-pocket
Control group	49	32	17	10	32	4	3
Intervention group	49	38	11	4	34	6	5
χ^2/T value		χ^2 = 1.800		χ^2 = 3.092			
P-value		0.18		0.079			

1.2 Intervention method

The control group received standard palliative care, including symptom management, comfort care, psychological support, and group-based education on dying. The intervention group received the same standard care, but with the addition of a visualised humanistic care programme based on Watson’s theory.

1.3 Formation of the Implementation team

A 14-member multidisciplinary team was formed, comprising the Head Nurse of the Palliative Care Ward, the Head of Department, one Senior Psychological Counsellor, two Associate Chief Physicians, two Associate Chief Nurses, five Senior Nurses, and two Postgraduate Nursing Students. The division of responsibilities was as follows:

- The senior psychological counsellor collaborated with the Head of Department and the Head Nurse to develop the visualised humanistic care practice programme.
- The Head Nurse organised and delivered standardised training to ensure uniformity and consistency in the programme's implementation.
- The Head of Department oversaw the assessment process and clarified each team member's responsibilities. The doctors and nurses will implement the clinical practice programme, while the two postgraduate nursing students will be tasked with designing, distributing, collecting and analysing data from the Delphi expert questionnaire.

1.4 Drafting the initial version of the visualised humanistic care practice plan

Team members conducted literature searches in Chinese and English databases, including CNKI, Wanfang Data, PubMed and Medline. The Chinese search terms included ‘palliative care’, ‘humanistic care’, ‘Watson’s Theory of Human Caring’, ‘visualisation’ and ‘dignity therapy’, while English terms included ‘Watson’s Theory of Human Caring’, ‘humanistic care’

and ‘palliative care’. Following a systematic collation and inductive analysis of the retrieved literature [4-7] and thorough discussion, a preliminary draft of a visualised humanistic care practice plan based on Watson’s Theory of Human Caring was developed, along with an implementation and evaluation pathway for the RE-AIM framework.

1.5 Delphi expert survey

The Delphi expert consultation method was employed to refine the aforementioned plan and evaluation pathway. Thirteen experts who met the criteria were included in the study. They were based in Beijing, Shanghai, Tianjin, Jiangsu Province and Fujian Province, and worked in institutions such as universities and hospitals. All of the experts' research fields encompassed palliative care and humanistic care. The experts' ages ranged from 37 to 53 years (mean age: 43.77 years), and their years of professional experience ranged from nine to 32 years (mean: 19.85 years). Six of the experts held senior professional titles, five held associate senior professional titles, and two held intermediate professional titles. Four of the experts held PhDs, six held Master's degrees and three held Bachelor's degrees. A total of two rounds of expert consultation were conducted. In each round, 13 questionnaires were distributed and 13 valid responses were received, resulting in a response rate of 100 per cent. The expert judgement consistency coefficient was 0.886, the familiarity coefficient was 0.923 and the expert authority coefficient was 0.905. Kendall’s coefficients of concordance for the two rounds were 0.162 and 0.398, respectively (both $p < 0.05$). Items with a mean importance score of $\geqslant 4.0$ and a coefficient of variation of $\leqslant 0.25$ were retained, and additions and deletions were made to the interventions based on expert recommendations. This ultimately resulted in a visualised humanistic care practice plan based on Watson’s Humanistic Care Theory (Table 2), as well as an implementation evaluation pathway based on the RE-AIM framework (Table 3).

Table 2: Visualised Humanistic Care Plan Based on Watson’s Theory of Humanistic Care

Watson’s Theory	**Intervention Measures**	**Specific Content**	**Theoretical Explanation**
Element 8: Providing a supportive and protective environment. Element 5: Encouraging the expression of, and acceptance of, positive and negative feelings.	Five Senses Palliative Care Room	(1) Listening to the Five Tones: Assess the patient’s emotional state and play soothing music based on the five tones of traditional Chinese medicine. (2) Visual Cards: Draw either a 'Reassurance Card', featuring various images of natural landscapes and heart-warming scenes, or a 'Rainbow Card', each of which bears a positive quote on the reverse, to guide patients to focus on positive imagery. (3) Scent Bottles: Inhale essential oils. The bottle labels clearly state the intended use of each oil, e.g. jujube seed oil for anxiety relief and patchouli for nausea control. (4) Tactile pillows: Customised pure cotton throw pillows designed to provide patients with tactile comfort. (5) Mindfulness treats: Yellow rock sugar or light floral tea is provided to patients to encourage them to savour the sensory experience of the present moment. While implementing these measures, intervention staff integrate the FIFE model into narrative dialogues with patients. Interventions take place on Mondays, Wednesdays and Saturdays from 16:00 to 16:40.	Providing multisensory stimulation creates a supportive therapeutic environment that promotes patients’ emotional expression and release.
Element 10:Allowance for	'Scroll of Life' VR	(1) Preparation of materials: Collect old photographs, videos, and artefacts such as work ID cards from key	The programme uses immersive

Watson’s Theory	Intervention Measures	Specific Content	Theoretical Explanation
existential-phenomenological-spiritual forces Element 2:Instillation of faith-hope	Dignity Therapy	milestones in the patient’s life. Gain an understanding of the events and significance behind these items. (2) Generation of immersive scenes: Using the collected materials, customise and generate 360° immersive virtual scenes for the patient using AI technology (such as the courtyard of their childhood home or the workshop where they worked in their youth). (3) VR-guided narrative: The patient wears VR goggles and the practitioner guides them into the virtual scene, facilitating a narrative centred on pre-defined meaningful events. (4) Dynamic Interaction and Expression: During the narrative process, the system uses AI to generate key virtual characters and encourage the patient to express unspoken words to these 'virtual loved ones', while playing personalised, soothing background music. (5) Creation of a 'Life Scroll' commemorative album: The entire VR experience is deeply integrated with the classic Dignity Therapy interview framework, ultimately generating a unique, visually evocative 'Life Scroll' commemorative album to be presented to the patient's family. Note: VR suitability: This experience is suitable for individuals without severe motion sickness, photosensitive epilepsy, or similar conditions, who are also physically able to tolerate it. Alternative option: For patients for whom VR is not suitable, a tablet is used to display a customised digital photo album or scene videos. The intervention takes place every Tuesday from 16:00 to 16:40.	scenarios to explore the meaning of life, helping patients to discover its value during difficult times, and instilling belief and hope.
Element 3: Cultivation of sensitivity to one's self and to others Element 6: Systematic use of a creative problem-solving caring process	‘Tree of Life’ Narrative Care	(1) Drawing the Tree of Life: Patients are given a standardised 'Tree of Life' template and coloured pens. They are guided through the process of externalising their life experiences and projecting them onto different parts of the tree. The roots represent foundations and origins, the trunk represents sustaining forces, the branches represent life's stages or directions, the leaves represent fond memories, the fruit represents achievements and loved ones, and wind and rain represent hardships endured. (2) Structured narrative interview: Conduct a structured interview centred on the patient’s 'Tree of Life' drawing. Using concrete, imagery-based questions, guide the patient to recount their life story, helping them to discover their inner strength and the meaning of their life. (3) Case documentation and reflection: Record key narrative turning points and positive metaphors from the dialogue in the patient’s personalised 'My Visualised Care Handbook', which serves as qualitative data for evaluating the programme’s effectiveness, as well as for	Visually externalising life stories using the Life Tree system in order to address problems scientifically, reconstruct the meaning of illness and uncover inner strength.

Watson’s Theory	Intervention Measures	Specific Content	Theoretical Explanation
		team reflection and supervision. Interventions take place every Thursday and Friday from 16:00 to 16:40. Note: For patients lacking the physical strength to express themselves, alternative methods are employed, such as dictation with a scribe or assistance with stickers/picture cards.	

Table 3: Implementation evaluation pathway based on the RE-AIM framework

Dimension	Core Objective	Visualisation Strategies	Evaluation Logic
Reach	Make sure that all target patients are included.	Visualisation of screening status: A green tick is added after the names of patients who have completed the informed consent process on the electronic information display at the nurses’ station and the bedside information screens. A triangle is added before the names of patients in the intervention group who meet the inclusion criteria, and a circle is added before the names of patients in the control group.	Real-time visual identification via electronic screens guarantees full coverage of the sample.
Effectiveness	Symptoms, sense of dignity, evaluation of visualised humanistic care practices, and improvements in patient satisfaction	Standardised scale assessments: (1) The Chinese version of the Edmonton Symptom Assessment Scale (ESAS). (2) The Chinese version of the Dignity Scale (PDI). (3) Visualisation of Humanistic Care Practice Evaluation Scale. (4) Humanistic Care Satisfaction Scale.	Use standardised scales to validate the effectiveness of the practice programme.
Adoption	Improving team implementation and patient acceptance	(1) At team level: ① Establish a multidisciplinary team, clearly define roles and responsibilities, and display these visibly on the electronic information screen at the nurses’ station. ② Conduct standardised training on the theory, skills and procedures of the programme to ensure consistency of the intervention. (2) Patient level: ① Encourage patients and their companions to actively participate in completing the ‘My Visualised Care Handbook’. ② Set up a ‘This Week’s Care Journey’ check-in area. ③ Introduce a ‘Family Voices’ section where family members can provide feedback.	Visualising team roles increases accountability among members. Similarly, visualising patient progress increases their sense of involvement.
Implementation	Safeguards to ensure standardised implementation	(1) Three-tier quality control system: ① Member self-assessment: Following the intervention, members rate their level of participation (did not participate, partially participated or participated fully) and the degree to	This establishes a closed-loop cycle of monitoring,

		which the intervention adhered to protocols (non-compliant, partially compliant or compliant) in the patient’s 'My Visualised Care Handbook'. ② Team leader review: The head nurse reviews the records during daily ward rounds. ③ Supervisor review: The Head Nurse conducts a sample review of 20 per cent of cases each week, interviewing patients to verify effectiveness and quality. (2) Quality Improvement Mechanism: Three weekly morning meetings are held to review progress; improvement measures, responsible parties and completion deadlines are recorded on the ‘Visual Improvement Checklist’ and posted in the designated area on the nurses’ station whiteboard for tracking.	providing feedback and making adjustments to ensure the action plan is implemented consistently.
Maintenance	Verifying the sustainability of outcomes	(1)Patient level: Conduct follow-up satisfaction surveys with patients and their families one month and three months after the intervention. (2) Departmental level: Following informed consent from patients and their families, anonymised patient-centred care records were created to demonstrate the department’s commitment to this approach.	Dual verification of sustainability: Short-term tracking of satisfaction outcomes Long-term knowledge transfer and preservation

1.6 Implementation of the Visualised Humanistic Care Programme

The intervention period lasts 12 days and must be completed within two consecutive weeks. One month prior to this, team members undergo intensive training covering the Guidelines for Humanistic Care in Palliative Care (T/CALC010-2025), Watson’s theory of humanistic care, operational standards for the three visualisation techniques, and the implementation and evaluation pathway based on the RE-AIM framework. Following the training, participants are assessed via standardised patient scenario simulations. Those who pass are eligible to participate in the clinical intervention.

1.7 Evaluation methods

Scale assessments were conducted by team members who had successfully completed the training at the following time points:

- Prior to the intervention (within 24 hours of admission)
- Upon completion of the intervention
- One month after the intervention
- Three months after the intervention (satisfaction assessment only)

(1) Symptom assessment for palliative care patients: The Chinese version of the Edmonton Symptom Assessment Scale (ESAS) was used to evaluate both groups of patients. This scale covers symptoms such as pain, fatigue, nausea, and depression, and is used to evaluate patients' symptom burden [8]. The severity of symptoms for each item was rated using a numerical scoring method, with scores ranging from 0 (no symptoms) to 10 (most severe). The Cronbach's α coefficient for this scale was 0.883 [9]. (2) Assessment of dignity in palliative care patients: The

Chinese version of the Dignity Scale (PDI) was used. The scale comprises five dimensions and a total of 25 items [10]. A numerical rating scale was used to assess the degree to which patients' dignity was impaired: scores ranged from 1 (no issues) to 5 (very serious issues), with a total score range of 25–125; a higher score indicates more severe impairment of dignity. Total scores were categorised into three levels: mild impairment (25–50 points), moderate impairment (51–75 points), and severe impairment (76–125 points) [11]. The Cronbach's α coefficient for this scale is 0.93. (3) Assessment of the effectiveness of humanistic care in palliative care: The assessment was conducted in accordance with Part Two of Appendix B, 'Visual Evaluation of Humanistic Care Practices', in the 'Guidelines for Humanistic Care Services in Palliative Care' (T/CALC010-2025) [1]. The evaluation utilised a numerical rating scale, with each item scored from 1 (strongly disagree) to 5 (very satisfied). The total score ranged from 10 to 50; a higher total score indicates better outcomes in humanistic care.(4) Evaluation of satisfaction with humanistic care in palliative care: The assessment used the seven single-choice items in Part 2, 'Satisfaction with Humanistic Care', of Appendix C of the guidelines [1]. The level of satisfaction with humanistic care was evaluated using a numerical rating scale ranging from 1 (very dissatisfied) to 5 (very satisfied), with a total score ranging from 7 to 35; a higher total score indicates greater satisfaction.

1.8 Statistical Methods

SPSS 26.0 software was used. Quantitative data are presented as the mean ± standard deviation. Comparisons between groups were performed using an independent samples t-test, while categorical data were analysed using a chi-squared test. A p-value of less than 0.05 was taken to indicate a statistically significant difference.

2 Results

2.1 Comparison of Edmonton Symptom and Dignity Scores Before and After the Intervention

There were no statistically significant differences in the Edmonton Symptom Assessment and Sense of Dignity scores before the intervention. Following the intervention, however, the scores in the intervention group were significantly lower than those in the control group ($P < 0.05$), as shown in Table 2.

Table 2 Comparison of scores on the Edmonton Symptom Assessment Scale and the Dignity Scale between the two groups before and after the intervention (points, $\bar{X} \pm s$)

Group	n	Edmonton Symptom Assessment		Sense of Dignity	
		Before intervention	After intervention	Before intervention	After intervention
Control group	49	49.90±7.50	41.47±6.22	66.18±9.85	58.47±9.78
Intervention group	49	48.82±5.41	35.18 ± 5.38	65.86 ± 8.47	51.53 ± 8.87
T-value		0.819	1.015	0.176	3.679
P-value		0.415	0.000	0.861	0.000

Note: all comparisons are made with pre-intervention values within the same group, with a P value of less than 0.05.

2.2 Comparison of post-intervention scores on the Visualised Humanistic Care Practice Evaluation and the Humanistic Care Satisfaction Scale

Following the intervention, the scores for both the Visualised Humanistic Care Practice Evaluation and the Humanistic Care Satisfaction Scale were higher in the intervention group than in the control group ($P < 0.05$), as shown in Table 3.

Table 3 Comparison of post-intervention scores on the Visualised Humanistic Care Practice

Evaluation and the Humanistic Care Satisfaction Scale (scores, $\bar{X} \pm s$)

Group	n	Assessment of Visualised Humanistic Care Practices Post-intervention	Humanistic Care Satisfaction		
			Post-intervention	1 month after intervention	3 months after intervention
Control group	49	16.51±3.12	19.47 ± 2.36	18.65 ± 2.19	17.74±2.40
Intervention group	49	21.63±4.47	27.08 ± 3.25	27.96 ± 2.60	25.18 ± 3.46
T-value		-6.579	-13.271	-19.157	-12.384
P-value		0.000	0.000	0.000	0.000

3 Discussion

3.1 The integrated benefits of alleviating the burden of symptoms

This programme integrates the physiological, psychological, social and spiritual dimensions to create a holistic support atmosphere, in contrast to single-intervention approaches. Multisensory stimulation acts directly on the physiological–psychological symptom pathway, effectively alleviating physical symptoms such as nausea and pain in patients [12]. In-depth dialogue combined with the FIFE narrative model establishes a mechanism for the ongoing management of symptom clusters. The 'Scroll of Life' VR dignity therapy uses immersive scenarios to enable patients to explore the meaning of life and experience emotional catharsis, which aligns closely with Watson's theory of humanistic care. The dual mechanisms of attention diversion and evoking positive emotions alleviate pain-related neural pathways [13]. The 'Life Tree' narrative dialogue visualises life stories, guiding patients to focus on positive memories and inner strength. This directly fosters self-awareness and systematically reconstructs the meaning of their illness. This cognitive restructuring influences patients' perception of and coping with symptoms [14]. The aforementioned implementation plan, combined with the 'Implementation' component of the RE-AIM framework, ensures standardised execution and consistency whilst correcting technical deviations during implementation. The 'Reach' and 'Adoption' dimensions promote patient engagement and adherence to intervention measures jointly. Consequently, the significant alleviation of symptoms resulted from the combined effects of the multidimensional visualisation intervention programme, which was guided by Watson's Humanistic Care Theory and precisely targeted symptom pathways and the structured RE-AIM evaluation pathway.

3.2 Multidimensional Pathways for Experience-Based Dignity Preservation

Traditional dignity-centred therapies often produce suboptimal results due to factors such as patients' limited cognitive capacity and restricted ability to express themselves, as well as variations in healthcare professionals' skills. Virtual reality (VR) technology transforms the abstract concept of dignity into a visualised, tangible practice. Patients can immerse themselves in work scenarios from their youth, 'touch' work ID cards or medals of honour that hold memories, and interact with virtual loved ones. In this state of profound emotional resonance, language barriers are overcome, deep-seated emotions are released, and patients' belief in the meaning of life and the continuity of their legacy is rekindled. The 'Adoption' dimension of the RE-AIM framework includes a section titled 'Voices of Family Members', and creating a commemorative album fosters the experience of being witnessed by loved ones—a core source of dignity [15]. The 'narrative dialogue' feature of the Tree of Life—a visual externalisation technique—assists healthcare professionals in identifying inner strengths and positive resources that are obscured by illness. This facilitates the reconstruction of a positive sense of self. At the

same time, the 'Effectiveness' dimension of the RE-AIM framework directly validates quantifiable improvements in dignity. The 'Reach', 'Adoption' and 'Implementation' dimensions address systemic issues such as patient participation and the standardisation of intervention delivery by practitioners. The 'Maintenance' dimension ensures the long-term, systematic maintenance of these effects. This structured RE-AIM pathway provides a mechanism for continuous improvement in the practical application of Huasheng’s theory of humanistic care.

3.3 The RE-AIM Framework Ensures the Sustainability of the Programme

Patients in the intervention group demonstrated significant improvements in satisfaction levels immediately after the programme and at the one- and three-month follow-ups, reflecting the programme's sustainability. This outcome is attributable to the RE-AIM framework's systematic design: 'Reach' ensures that no patients are overlooked, 'Adoption' promotes patients' and families' understanding and acceptance of the programme through team training and the My Visualised Care Handbook, and 'Effectiveness', validated by scale assessments, demonstrates the programme's significant impact and is the most direct source of satisfaction. 'Implementation' ensures that the programme is carried out in a standardised and high-quality manner, whilst tangible visual outcomes such as the Life Canvas reinforce patients' perception of the programme's value, thereby enhancing satisfaction. 'Maintenance' tracks the longevity of the programme and transforms success stories, practical tips, and life narratives into visible, shareable, and transferable knowledge assets. It incorporates Watson's theory of humanistic care into the department's ongoing processes, providing organisational safeguards for the long-term delivery of high-quality, humanistic care services.

4.Summary

The visualised humanistic care programme, which is based on Huaseng’s theory, has been validated using the RE-AIM framework. It has been shown to significantly alleviate patients’ symptoms, enhance their sense of dignity, and maintain long-term satisfaction. With its standardised manuals and alternative equipment options, the programme is ready to be expanded into oncology, geriatrics, and community palliative care. In future, a large-scale, multicentre, randomised controlled trial will be conducted to validate the programme's long-term cost-effectiveness and support the standardisation of national palliative care pilot schemes.

Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Binzhou People's Hospital (approval number: 2024B619). Written informed consent was obtained from all participants. The study complied with the Declaration of Helsinki.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due to patient privacy and ethical restrictions, but are available from the corresponding author on reasonable request.

Competing interests

No potential conflict of interest was reported by the authors.

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Authors’ contributions

Yameng Dong and Yong Qu : Wrote the original paper; Fang Gong and Shufen Zhao: Analyzed the data and implement the intervention; Ying Zhang: Overall plan supervision

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