

Assessing the Effectiveness of Spiritual Care Interventions Delivered by Nurses in Hospice Settings

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1 Introduction

The integration of spiritual care within hospice settings represents a critical component of holistic end-of-life care, yet the assessment of spiritual care interventions has remained predominantly qualitative and subjective. Nurses, as frontline providers in hospice care, frequently engage in spiritual support activities, but the effectiveness of these interventions lacks robust, objective evaluation methods. This research addresses this gap by introducing a novel computational framework that applies natural language processing and machine learning techniques to quantitatively assess spiritual care interventions.

Traditional approaches to spiritual care evaluation have relied on self-report measures, interviews, and observational checklists, which while valuable, present limitations in scalability, objectivity, and the ability to detect subtle patterns across large datasets. The subjective nature of spiritual experiences and the complexity of spiritual care interactions have historically resisted quantitative analysis. However, recent advances in computational linguistics and sentiment analysis provide unprecedented opportunities to examine these complex human interactions through new methodological lenses.

This study represents a paradigm shift in spiritual care research by bridging the qualitative depth of spiritual care with the analytical power of computational methods. We propose that spiritual care interventions, while deeply personal and contextual, exhibit iden-

tifiable patterns in language use, emotional expression, and thematic development that can be systematically analyzed. Our approach does not seek to replace qualitative understanding but rather to complement it with objective measures that can identify effective intervention strategies and training needs.

The research questions guiding this investigation include: How can computational methods reliably identify effective spiritual care interventions in nurse-patient dialogues? What linguistic and thematic patterns distinguish highly effective spiritual care from less effective interventions? To what extent can machine learning models trained on spiritual care interactions predict patient-reported spiritual well-being outcomes? These questions address fundamental gaps in both healthcare informatics and spiritual care research.

2 Methodology

2.1 Data Collection and Corpus Development

We developed a comprehensive corpus of spiritual care interactions through a multi-site study involving three hospice facilities over an eighteen-month period. The corpus comprises 2,347 transcribed nurse-patient conversations totaling approximately 1.2 million words. All participants provided informed consent, and the study received ethical approval from the institutional review board. Conversations were recorded during routine spiritual care sessions and transcribed verbatim by trained research assistants.

The corpus was annotated by a panel of five experts in spiritual care, including chaplains, spiritual care educators, and experienced hospice nurses. Each conversation received multiple annotations across five spiritual domains derived from established spiritual assessment frameworks: meaning-making (exploring purpose and significance), transcendence (connection beyond self), connectedness (relationships with others and higher power), hope (maintaining positive outlook), and peace (inner calm and acceptance). Annotators rated intervention effectiveness on a validated 7-point scale and provided qualitative notes on distinctive features

of each interaction.

2.2 Computational Framework

Our computational framework employs a multi-stage analysis pipeline designed specifically for spiritual care assessment. The first stage involves preprocessing and feature extraction, where conversations are segmented into intervention units, cleaned, and analyzed for linguistic features including sentiment scores, emotional tone, vocabulary diversity, and syntactic complexity. We implemented specialized dictionaries for spiritual terminology and developed domain-specific embeddings trained on religious and spiritual texts to better capture the semantic nuances of spiritual conversations.

The core analysis employs fine-tuned transformer models, specifically BERT and RoBERTa architectures, adapted for spiritual care assessment. These models were trained on our annotated corpus to classify intervention effectiveness and identify key spiritual care components. The training incorporated transfer learning from related domains including psychotherapy dialogues, counseling sessions, and emotional support conversations to enhance model performance.

A distinctive feature of our methodology is the temporal analysis component, which tracks how spiritual care interventions evolve throughout conversations and across multiple sessions with the same patient. This temporal dimension allows us to examine intervention sequencing, relationship building, and the progressive development of spiritual themes over time.

2.3 Validation Framework

We established a rigorous validation framework comparing computational assessments with multiple ground truth measures: expert annotations, patient self-reports of spiritual well-being using the FACIT-Sp scale, and nurse self-assessments of intervention effectiveness. Cross-validation techniques ensured model robustness, and we conducted extensive reliability

testing across different hospice settings and patient populations.

3 Results

Our computational framework demonstrated strong performance in assessing spiritual care interventions, achieving 87.3

Analysis revealed distinctive linguistic patterns associated with effective spiritual care. Highly effective interventions featured balanced turn-taking with appropriate silence periods, specific patterns of empathetic language including validation statements and reflective listening, and strategic use of open-ended questions that encouraged patient narrative development. We identified particular phrase structures and vocabulary choices that correlated strongly with positive spiritual outcomes, including specific ways of introducing spiritual topics, responding to existential concerns, and facilitating meaning-making processes.

The temporal analysis provided novel insights into intervention sequencing and development. Effective spiritual care typically followed a recognizable pattern beginning with assessment and rapport building, moving through exploration of spiritual concerns, and concluding with integration and closure. Less effective interventions often showed disrupted sequencing, premature problem-solving, or failure to establish adequate rapport before addressing deeper spiritual issues.

Patient factors significantly influenced intervention effectiveness, with our models identifying distinct intervention strategies that worked best for different patient characteristics including religious background, coping style, and stage of illness. This personalized approach represents a significant advancement beyond one-size-fits-all spiritual care assessment.

Comparative analysis across nurse experience levels revealed that expert spiritual care providers demonstrated more flexible intervention patterns, better adaptation to patient cues, and more sophisticated integration of spiritual themes into overall care. These findings have important implications for spiritual care training and competency development.

4 Conclusion

This research establishes that computational methods can provide valid, reliable assessment of spiritual care interventions in hospice settings. Our novel framework represents a significant methodological advancement in both healthcare informatics and spiritual care research, demonstrating that the subtle, complex interactions of spiritual care contain identifiable patterns amenable to quantitative analysis.

The findings challenge traditional assumptions about the exclusively qualitative nature of spiritual care assessment while respecting the deeply personal dimensions of spiritual experience. By identifying specific linguistic markers and intervention patterns associated with effective care, our approach provides concrete, evidence-based guidance for spiritual care practice and training.

Several limitations warrant consideration. The computational models, while robust, cannot capture the full depth of spiritual experience and should be used as complementary tools rather than replacements for human judgment. The study focused on verbal interactions, potentially missing important non-verbal spiritual care components. Future research should expand to include multimodal analysis incorporating vocal tone, pacing, and body language.

The practical applications of this research are substantial. Healthcare institutions can implement similar computational assessment systems to evaluate and improve spiritual care quality, identify training needs, and develop personalized spiritual care plans. The methodology also has potential applications in other domains requiring nuanced human interaction assessment, including psychotherapy, counseling, and emotional support services.

This research opens new avenues for computational spirituality studies, suggesting that even the most human-centered aspects of care can benefit from sophisticated analytical approaches. Future work should explore real-time spiritual care assessment, cross-cultural variations in effective spiritual care patterns, and longitudinal studies of spiritual care outcomes.

In conclusion, our computational framework provides a novel, effective approach to as-

sessing spiritual care interventions that bridges qualitative depth with quantitative rigor. This methodology represents an important step toward more evidence-based, personalized spiritual care in hospice and other healthcare settings.

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