Taxonomy and Terminology for Non-Invasive Breathing Techniques Used in Radiotherapy: First Results of a Delphi Survey

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Introduction

Non-invasive breathing techniques are increasingly explored in radiotherapy for motion management, aiming for treatment reproducibility, optimizing organ-at-risk sparing, and enhancing patient cooperation. However, terminology and classification remain highly heterogeneous across centers, publications, and clinical practices. The absence of a standardized taxonomy hinders communication, comparability of studies, and multicenter implementation. This Delphi study aims to establish expert consensus on a unified taxonomy and standardized terminology for non-invasive breathing techniques used in radiotherapy.

Methods

A Delphi survey was conducted with international clinicians and researchers experienced in motion management and non-invasive breathing techniques in radiotherapy. The study included a minimum of two and up to five rounds. In each round, participants rated proposed terminology and definitions using a Likert scale and provided written suggestions for refinement. A 70% agreement threshold was predefined for consensus. Round 1 items were based on a preliminary taxonomy and a table of proposed definitions and abbreviations. Round 2 incorporated anonymized feedback from Round 1, including individualized summaries of each participant's previous answers.

Results

Eighteen experts from nine countries completed Round 1. A total of 42 terminology items were evaluated in the initial round. Extensive qualitative feedback highlighted both the relevance of the initiative and the conceptual complexity of defining interconnected breathing techniques.

Several items reached consensus in Round 1 and were retained unchanged, including the standardized use of brpm (breaths per minute) to report breathing frequency and the retention of established terms such as CPAP and DIBH. Experts also approved the conceptual distinction between patient-driven and device-driven breathing management techniques, forming the basis of a structured taxonomy. Guidance techniques were considered supportive tools rather than breathing management strategies. Items without consensus were revised based on participants' suggestions, resulting in 27 items submitted to Round 2, which is currently ongoing with updated formulations, clarifications, and a refined summary figure distributed to all participants. Study completion is expected in April 2026.

Conclusion

This international Delphi project represents the first structured effort of the BRIC to establish a shared taxonomy and standardized terminology for non-invasive breathing techniques in radiotherapy. Early rounds demonstrate strong expert engagement, initial consensus on key terminology, and the feasibility of building a structured taxonomy. The final taxonomy is expected to facilitate clearer clinical communication, improve research comparability, and support harmonization across institutions.