consensus statement

Management of Patients Requiring Prolonged Mechanical Ventilation*

Report of a NAMDRC Consensus Conference

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Patients requiring prolonged mechanical ventilation (PMV) are rapidly increasing in number, as improved ICU care has resulted in many patients surviving acute respiratory failure only to then require prolonged mechanical ventilatory assistance during convalescence. This patient population has clearly different needs and resource consumption patterns than patients in acute ICUs, and specialized venues, management strategies, and reimbursement schemes for them are rapidly emerging. To address these issues in a comprehensive way, a conference on the epidemiology, care, and overall management of patients requiring PMV was held. The goal was to not only review existing practices but to also develop recommendations on a variety of assessment, management, and reimbursement issues associated with patients requiring PMV. Formal presentations were made on a variety of topics, and writing groups were formed to address three specific areas: epidemiology and outcomes, management and care settings, and reimbursement. Each group was charged with summarizing current data and practice along with formulation of recommendations. A working draft of the products of these three groups was then created and circulated among all participants. The document was reworked with input from all concerned until a final product with consensus recommendations on 12 specific issues was achieved. ***(CHEST 2005; 128:3937–3954)***

Key words: assessment; Diagnosis Related Group; epidemiology; long-term acute care; patient management; prolonged mechanical ventilation; reimbursement; short-term acute care

Abbreviations: APACHE = acute physiology and chronic health evaluation; CMS = Center for Medicare and Medicaid Services; CS = cardiac surgery; DRG = Diagnosis Related Group; *f*/VT = respiratory frequency/tidal volume; GMLOS = geometric mean length of stay; HHC = home health care; HiH = hospital-within-a-hospital; IRF = inpatient rehabilitation facility; LOS = length of stay; LTAC = long-term acute care; NIV = noninvasive mask ventilation; $P_{0.1}$ = airway pressure 100 ms after an inspiratory effort against a closed shutter; PImax = maximal inspiratory pressure; PMV = prolonged mechanical ventilation; PPS = Prospective Payment System; PS = pressure support; RUG = resource utililization group; SBT = spontaneous breathing trial; SNF = skilled nursing facility; STAC = short-term acute care

Conference Format and Goals

In May 2004, NAMDRC, formerly the National Association for Medical Direction of Respiratory Care, a physician advocacy organization for excellence in the delivery of respiratory and critical care (namdrc.org), sponsored a 2-day conference on "best practices" associated with the care and management of patients requiring prolonged mechanical ventilation (PMV). The goal was to review existing practices and develop recommendations on a variety of assessment, management, and reimbursement issues associated with patients requiring PMV. Conference

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participants included invited speakers and panelists along with representatives from the American College of Chest Physicians, the American Thoracic Society, the American College of Physicians, the American Academy of Home Care Physicians, the American Association for Respiratory Care, and the Society of Critical Care Medicine, and sponsors from industry.

On the first day of the conference, the speakers and panelists reviewed a wide range of topics. On the second day, three writing groups were formed and a chairperson for each group was appointed. The first group addressed epidemiology and outcomes, the second group addressed management and care settings, and the third group addressed reimbursement issues. Each group was charged with summarizing current data and practice along with formulation of recommendations.

A working draft of the products of these three writing groups was then created and circulated first among the writing group chairmen and later among all participants. The document was reworked with input from all concerned until a final product with consensus recommendations on 12 specific issues was achieved. The results are presented below.

Issue 1: What Constitutes PMV?

The definition of PMV depends on what body defines it: regulatory bodies, caregivers, or investigators publishing in this field. Defining what constitutes PMV is of considerable relevance. Analogous to staging a disease process, a uniform definition is essential for interpreting the literature, analyzing outcomes data (including benchmarking), guiding management decisions (including the site of care), and influencing reimbursement schemes. A uniform and broadly accepted definition is also essential as a starting point for prospective epidemiologic studies and for enrolling patients in randomized controlled trials.

In surveying the existing literature, PMV has been variously defined as > 24 h,[1,2] > 2 days,[3] > 14 days,[4] or > 29 days[5] of mechanical ventilation or, alternatively, the need for post-ICUs mechanical ventilatory support.[6] The most widely applied definitions involve patients who fall under several of the Center for Medicare and Medicaid Services (CMS) Diagnosis Related Groups (DRGs) focused on mechanical ventilatory support (DRG 475, respiratory disease and mechanical ventilation > 96 h; DRG 483, tracheostomy with mechanical ventilation ≥ 96 h with principal diagnosis except for face, head, and neck diagnoses; DRG 541, tracheostomy with mechanical ventilation ≥ 96 h with principal diagnosis except face, mouth, and neck diagnosis with major operating room procedure; DRG 542, tracheostomy with mechanical ventilation ≥ 96 h with principal diagnosis except face, mouth, and neck diagnosis without major operating room procedure. Generally, these patients who have required at least 6 h of mechanical ventilation for > 21 consecutive days. This 21-day stipulation is consistent with the observation that the majority of patients who are transferred to a long-term acute care (LTAC) hospital receiving mechanical ventilation have received ventilation for at least 21 days.[6–9]

The CMS requirement of ≥ 6 h/d may be too stringent, as even shorter periods of mechanical ventilation through an artificial airway may have important implications for the selection of a care site and for equipment needs (*eg*, a ventilator is still needed even if < 6 h/d of ventilatory support is required). Conversely, the large number of stable outpatients who use noninvasive mask ventilation (NIV) at night suggests that the need for NIV should only connote ventilator dependence when required for ≥ 6 h/d (or more than a nocturnal application).

Recommendation 1

PMV should be defined as the need for ≥ 21 consecutive days of mechanical ventilation for ≥ 6 h/d. Research is needed to better understand which definitions of PMV are most commonly used, how they are currently being employed, and how they impact costs, outcomes, and reimbursement in the United States.

Issue 2. What Are the Epidemiology and Natural History of PMV?

Incidence/Prevalence

The incidence and prevalence of PMV depends on the setting studied and definitions used. Prospective cohort studies are perhaps the best sources for this information, although they are often limited to specific sites that may not be readily generalized to other settings. Such studies[10–12] have demonstrated that 5 to 20% of the patients supported with mechanical ventilation in the ICU will not wean in 2 to 4 days. One international prospective cohort study[13] in 1998 of patients receiving mechanical ventilation from 361 ICUs indicated that 25% of patients received mechanical ventilation for > 7 days.

The APACHE (acute physiology and chronic health evaluation) III database may more accurately reflect the ICU population of patients receiving mechanical ventilation.[14] This data set included patients consecutively admitted to adult medical and

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