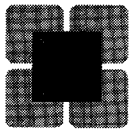

Ordering respiratory care services for hospitalized patients: practices of overuse and underuse

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■ Because of recent concerns about misallocation of respiratory care services and analyses suggesting that limiting services to comply with established guidelines reduces unneeded therapies without compromising quality of care, the authors audited the records of 170 patients newly ordered to receive at least one of five respiratory therapies (oxygen therapy, incentive spirometry, bronchopulmonary hygiene, aerosolized bronchodilator therapy, or intermittent positive pressure breathing) at The Cleveland Clinic Foundation. In reviewing whether the therapies that were ordered complied with published guidelines for these services, we found that 25.2% were "not indicated." This over-ordering incurred unnecessary total charges of $11,937 ($206.16 per patient) and occupied therapist time that could have been better allocated to other services. These costs were offset by the finding that 10.5% of the patients were not ordered to receive indicated respiratory therapies. Our proposed strategy of initiating protocols for ordering and providing respiratory care services (ie, via a respiratory care consult service) is an appealing means to address this misallocation, but it requires further evaluation.

□ INDEX TERMS: RESPIRATION, ARTIFICIAL; UTILIZATION REVIEW □ CLEVE CLIN J MED 1992; 59:581–585

AS A RESULT of advancing technology, respiratory care services have expanded greatly since 1960, accounting for 3% of all hospital expenditures in 1980.[1] Some respiratory therapy modalities have come under criticism for being overused and of unproven efficacy. The prime example of this is intermittent positive pressure breathing (IPPB), which was closely scrutinized in the early 1970s and has since decreased significantly in use.[2] Similar claims of overuse and inappropriate use have focused on oxygen therapy,[3] incentive spirometry,[4] aerosol therapy,[5] and bronchopulmonary hygiene or chest physiotherapy.[1] Both the financial pressure resulting from fixed-payment reimbursement and quality-of-care considerations make it increasingly important to ensure that respiratory care services are provided only when indicated as determined by widely accepted guidelines.

Recent analyses in tertiary care facilities suggest that limiting respiratory care services to strictly comply with established guidelines can achieve substantial savings without an adverse impact on patient care.[6,7] Schwinger et al examined a series of low-risk patients undergoing cholecystectomy[4] and suggested that routine incentive spirometry confers little benefit in this setting, and could be eliminated. Overall, ample evidence suggests that the quality of patient care is not diminished by appropriate reductions in respiratory care services, and that cost savings are realized by such a strategy.[4,7,8]

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TABLE 1
DISTRIBUTION OF 230 RESPIRATORY ORDERS BY TYPE OF THERAPY

Order type	Number of orders
Aerosol therapy	50
Bronchopulmonary hygiene	50
Incentive spirometry	50
Intermittent positive pressure breathing	30
Oxygen therapy	50

TABLE 2
DISTRIBUTION OF 170 PATIENTS BY NUMBER OF RESPIRATORY THERAPY ORDERS

Number of orders given	Number of patients (%)
1	122 (72%)
2	38 (22%)
3	8 (5%)
4	2 (1%)

TABLE 3
INDICATIONS FOR RESPIRATORY THERAPY

Treatment	Indications
Aerosolized bronchodilators	Bronchospasm associated with: Bronchitis Asthma Emphysema Bronchiectasis Cystic fibrosis Diminished breath sounds Excess sputum production
Bronchopulmonary hygiene	Secretions Visible sputum production Auscultation of rhonchi Possible mucous plugs Recent history of secretions Decreased breath sounds History of pulmonary disease associated with secretions
Incentive spirometry	Atelectasis Decreased breath sounds on auscultation Chest radiograph findings Prevention of atelectasis After upper abdominal or thoracic surgery Patient at complete bed rest Obesity
Intermittent positive-pressure breathing	Prevention or reversal of atelectasis Inability to achieve minimal predicted vital capacity (15 ml/kg)
Oxygen therapy	Hypoxemia Room air PaO2 <65 mmHg Increased respiratory rate Cyanosis Tachycardia Chest pain associated with cardiac disease

An increasing number of respiratory care departments are establishing in-house guidelines for appropriate respiratory care and are ensuring that the guidelines are followed.[9,10] One strategy for ensuring that respiratory care services are administered appropriately is to create a Respiratory Care Consult Service, in which respiratory therapy services are prescribed by the hospital's respiratory care section (staffed by therapists and pulmonary physicians) on the basis of established guidelines. Increasing demand for respiratory care services threatens to outstrip resources, and strategies are needed to optimize expert allocation of services. To assess current performance and to establish a baseline for future comparison, the present study reviewed the appropriateness of respiratory care orders and the cost impact of eliminating overuse of inpatient respiratory care services at The Cleveland Clinic Foundation, a large tertiary care facility.

METHODS

We audited 230 respiratory care orders written for 170 randomly selected new inpatients (mean 1.35 types of therapy per patient, range 1 to 4) at The Cleveland Clinic Foundation over a 2-month period beginning January 1987. To avoid bias in patient selection, patients from most of the non-ICU inpatient wards were included. *Tables 1* and *2* present the distribution of therapies for the 170 patients. Overall, 29% of patients were ordered to receive multiple treatment types. Based on published guidelines,[3–6] charts were reviewed by a registered respiratory therapist (L.K.) for the appropriateness of orders for five selected respiratory care procedures: oxygen therapy (50 patients), incentive spirometry (50 patients), bronchopulmonary hygiene (percussion, vibration, or postural drainage, 50 patients), aerosolized bronchodilator therapy (50 patients), and IPPB (30 patients). All IPPB recipients were seen (by L.K.) for direct measurement of vital capacity.

As summarized in *Table 3*, criteria for appropriate selection of respiratory care services were used, based on published guidelines.[3–6] For this audit of the appropriateness of use, the criteria were reviewed by the medical director of the Respiratory Therapy Section (J.K.S.) and were made explicitly lenient in order to avoid overzealous classification of services as inappropriate. For example, incentive spirometry was deemed appropriate for patients over age 65 undergoing upper abdominal surgery, patients with chronic

TABLE 4
SUMMARY OF AUDIT

Treatment	Patients treated	Total Tx	Charge per Tx*	Total charge*,†	Patients for whom Tx NI (%)	Total Tx NI	Charges for Tx that were NI*,†	Patients for whom Tx indicated but not ordered (%)
Aerosol	50	1,003	$10.00	$10,530	6 (12.0%)	74	$800	6 (12.0%)
Bronchopulmonary hygiene	50	952	$25.50	$26,119	16 (32.0%)	263	$6,849	4 (8.0%)
Intermittent positive-pressure breathing	30	195	$20.00	$4,500	12 (40.0%)	75	$1,740	2 (6.7%)
Incentive spirometry	50	256	$ 8.00	$3,998	10 (20.0%)	47	$766	2 (4.0%)
Oxygen therapy (1 "Tx" = 1 day)	50	324	$18.00	$6,732	14 (28.0%)	87	$1,818	4 (8.0%)
Totals	230‡	2,730	–	$51,879	58 (25.2%)	546	$11,937	18 (10.5%)

*Based on Cleveland Clinic Foundation charges, February, 1987
†Includes initial set-up or evaluation charges
‡Some patients had more than one treatment type
Tx = Treatment
NI = Not indicated

pulmonary disease, patients on complete bedrest, and patients unable to achieve at least half of their predicted inspiratory capacity.[4,6,11] As specified in several recent consensus statements,[1,3,12,13] supplemental oxygen was deemed indicated when arterial oxygen tension was <65 mm Hg, a deliberately lenient threshold intended to provide a margin that prevents precipitous desaturation. The indications for bronchopulmonary hygiene were current sputum production or a history of mucus hypersecretion.[1,14] Aerosolized bronchodilator therapy was deemed indicated for bronchospasm, current sputum production, or a history of asthma, chronic bronchitis, emphysema, or cystic fibrosis.[1,5] As an example of the lenience of these criteria, aerosol bronchodilator use was considered appropriate even if the patient could effectively use a metered-dose inhaler delivering the same bronchodilator. Finally, the indication for IPPB was an inability to achieve a vital capacity exceeding a predicted minimum of 15 mL/kg of ideal body weight. Vital capacity was measured using a Respiradyne handheld respirometer.[11,15]

In addition to reviewing the appropriateness of ordered treatments, unfulfilled indications for respiratory care were also recorded for the 170 patients in order to ascertain the frequency with which respiratory care services were deemed indicated but were not ordered.

RESULTS

Table 4 presents our findings regarding the appropriateness and cost of respiratory care services for 230 orders in 170 patients whose charts were reviewed. Overall, 2,730 respiratory treatments were administered. Of the 230 orders, 58 (25.2%) were not deemed indicated.

Aerosol therapy was the most commonly used respiratory treatment (1,003 treatments in 170 patients) and the most frequently used treatment per patient. It was also the treatment for which the fewest respiratory treatments were deemed not indicated (12% of recipients). In contrast, 32% of the orders for BPH were not indicated, resulting in 263 inappropriate treatment orders. This was the largest number of inappropriate orders for all categories. Of the 50 recipients of oxygen therapy, 14 (28%) received oxygen that was deemed not indicated, resulting in 87 days of inappropriate oxygen therapy (*Table 4*). Incentive spirometry accounted for the fewest per capita treatments (256 treatments in 50 patients) and was deemed not indicated in 20% of recipients. The least indicated treatment was IPPB: 40% of recipients were felt to be inappropriately treated with this modality.

Offsetting the treatments deemed inappropriate were treatments deemed indicated but not ordered. Altogether, 18 of the 170 patients (10.5%) were felt to be appropriate candidates for respiratory care services but were not offered these services by the ordering health care providers. Though aerosol therapy was the least frequently inappropriately ordered treatment, it was also the most overlooked, with 12% of patients not receiving aerosol therapy deemed appropriate candidates in the audit.

Table 3 presents the financial consequences of overusing respiratory care services in our 170 patients. In addition to the per-treatment charges, total charges in

this table reflect initial setup or evaluation fee. As a result, total charges listed may exceed the product of the per-treatment charge and the number of treatments. Based on current charges for individual services at The Cleveland Clinic Foundation, nonindicated treatments in these patients generated $11,937 in charges, or 23% of all charges. As with the total number of respiratory treatments given, the charges for superfluous treatments are partially offset by the charges for treatments that were indicated but not ordered. However, because the number of treatments that would have been required for the patients not receiving indicated treatments is not known, the exact amount of charges that would have been incurred for treatments not ordered cannot be determined from this analysis. As an estimate, based on an average charge per order of $225.17 ($51,789 divided by 230 orders), treatments that were indicated but not ordered would be expected to incur charges of $4,053.

DISCUSSION

Like many effective clinical interventions, respiratory care services can be overused, with superfluous services incurring expense without the promise of benefit.[4,16,17] Stimulated by the current cost-conscious health care climate and by shrinking health care resources, many analysts have detected overuse of respiratory care services for inpatients and have offered strategies to minimize overuse while preserving beneficial services, thereby realigning clinical need and treatment. In a comprehensive audit of respiratory care services at the New England Deaconess Hospital, Zibrak et al[6] detected substantial overuse of respiratory care services. A resulting reduction of services (aerosol medication reduced by 58%, IPPB reduced by 92%, incentive spirometry reduced by 55%, and ultrasonic nebulization decreased by 57%) produced substantial savings with no detectable adverse impact on patient outcome, as assessed by mortality, frequency of postoperative pulmonary complications, and hospital length of stay.[6] In our series, the degree of overuse (approximately 25%) is less than that detected by Zibrak et al.

Clearly, the occurrence and degree of overuse of respiratory care services is determined by individual institutional characteristics—ie, the patient population served and the health care providers who are responsible for ordering respiratory care services—and by the criteria by which the appropriateness of respiratory care services is assessed. The criteria for appropriateness used in the current analysis are adopted from standard, widely accepted sources.[1–3,6,11–13] Also, respiratory care services at The Cleveland Clinic Foundation are ordered by various groups of health care providers: staff physicians, house officers and fellows, and physicians' assistants who participate in direct patient care. The mechanisms for ordering respiratory care services and the population served in our institution are representative of large, tertiary care, academic institutions.

While the observation of overuse is certainly noteworthy, an equally striking observation in the present series is that respiratory care services were underordered in the same patient group in which overuse was observed. For 18 of the patients (10.5%), respiratory care services were deemed indicated, but were not ordered. These patients would have been expected to benefit from respiratory care services that were not ordered for them. Moreover, we suspect that the prevalence of underuse in the current analysis is an underestimate: our audit excluded patients who did not receive any respiratory care services, who might also be underserved.

Overall, our observation that underuse partially offsets overuse of services within the same patient group suggests that respiratory care services are being misallocated. Though beyond the scope of our analysis, we suspect that some of this misallocation is due to the wide range of respiratory care expertise of individuals ordering respiratory care services. If this is so, a broad-reaching educational effort about guidelines for respiratory care is an appealing response. In addition, the misallocation also invites consideration of alternate, more expert ways of allocating respiratory care services. Proposed strategies for optimizing allocation of respiratory care services include authoritative medical direction[14] and institutional protocols for prescribing respiratory care.[5,10]

An extension of uniform protocols for respiratory care services would be to establish a Respiratory Care Consult Service, through which respiratory care services would be allocated by a team of respiratory therapists and pulmonary physicians who would use predetermined, approved protocols for ordering respiratory care, and who would be invited to evaluate patients with respiratory problems. Our analysis supports this concept, which is currently being implemented at our institution. Our audit also provides a baseline experience against which the future impact of such a service can be compared.

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