

# Comparison of Therapist-Directed and Physician-Directed Respiratory Care in COPD Subjects With Acute Pneumonia

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**BACKGROUND:** The purpose of this retrospective medical record review was to compare the effects of therapist-directed (protocol RT) and physician-directed (non-protocol RT) respiratory therapy on hospital stay and 30-d post-discharge readmission in COPD subjects with acute bacterial pneumonia. **METHODS:** We reviewed 320 medical records; 244 records were usable. Information gathered included gender, age, RT protocol type (protocol RT or non-protocol RT), hospital stay, 30-d post-discharge readmission, and disease severity score. A 3-way analysis of variance and post hoc analysis were performed to determine the possible effects of disease severity, age, and RT protocol type on hospital stay and the possible interaction effects among these independent variables. A chi-square test for independence was computed to determine whether there was an association between RT protocol type and 30-d readmission. **RESULTS:** There were no significant interaction effects among RT protocol type, age, and disease severity on hospital stay. In addition, there were no significant effects of either RT protocol type ( $P = .41$ ) or age ( $P = .85$ ) on hospital stay in our subject sample. However, as expected, disease severity had a significant effect on hospital stay, increasing it by a mean of 2.6 d (95% CI 0.77–4.4,  $P = .005$ ). The chi-square test for independence revealed that the frequency of 30-d readmission was significantly associated with RT protocol type ( $P = .02$ ); fewer 30-d readmissions were associated with protocol RT. **CONCLUSIONS:** We interpreted the finding of no difference in mean hospital stay between protocol and non-protocol RT to indicate that protocol RT did not confer a disadvantage to subjects in terms of hospital stay. Additionally, the results suggest that treatment efficacy is not sacrificed when RT is directed by respiratory therapists rather than by physicians regardless of disease severity and that therapist-directed protocols may have been of some benefit in reducing 30-d post-discharge readmission. *Key words:* respiratory therapy; COPD; patient readmission; patient discharge; stay; severity of illness index. [Respir Care 2015;60(2):151–154. © 2015 Daedalus Enterprises]

## Introduction

Respiratory therapy (RT) protocols are based on published evidence-based clinical practice guidelines. Proto-

cols help standardize patient care and give respiratory therapists the ability to deliver timely care without waiting for an order from a physician. Our institution subscribes to the American Association for Respiratory Care's definition of therapist-implemented protocols<sup>1</sup>. Physicians at our hospital have the option to order RT per protocol or to order and direct the course of RT themselves. When physicians order RT by protocol, respiratory therapists interview and

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Supplementary material related to this paper is available at <http://www.rcjournal.com>.

The authors have disclosed no conflicts of interest.

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DOI: 10.4187/respcare.03208

assess the patient, determine the most appropriate RT treatment plan, write orders, implement therapy per protocol, monitor treatment effectiveness, and adjust, discontinue, or restart treatment, keeping the physician informed at all times.

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A number of studies in various health-care disciplines have compared therapist-directed RT (protocol RT) with physician-directed RT (non-protocol RT). Several studies have failed to show a significant difference in subject outcomes between protocol and non-protocol RT.<sup>2,3</sup> However, Hermeto et al<sup>4</sup> found that protocol RT in the neonatal ICU significantly reduced weaning time in mechanically ventilated neonates compared with non-protocol RT. Similarly, protocol RT was found to reduce the duration of mechanical ventilation in adult subjects.<sup>5,6</sup> Protocol RT has also been credited with reducing ICU readmission secondary to atelectasis, mucus plugging, and respiratory distress.

Therapist-directed protocols have been associated with significant cost savings to patients and hospitals<sup>4,7,8</sup> and have been shown to improve overall hospital resource utilization.<sup>7-9</sup> Kollef et al<sup>7</sup> demonstrated that protocol RT reduces the number of unnecessary treatments given, significantly lowering health-care costs without increasing adverse patient outcomes. Pikarsky et al<sup>10</sup> showed that protocol RT reduces medication errors by eliminating variations in practice. Importantly, protocol RT results in more timely therapy than non-protocol RT.<sup>11</sup>

This study addresses the effectiveness of protocol RT in COPD subjects admitted for exacerbations of their disease. Although Tramacere et al<sup>11</sup> studied the effectiveness of therapist-directed protocols in COPD in-patients, they focused on pulmonary rehabilitation outcomes. To our knowledge, this is the first study that compares hospital stay and 30-d readmission in COPD subjects with acute pneumonia receiving protocol RT versus non-protocol RT. Our research questions were: (1) does therapy protocol type (therapist-directed or physician-directed) affect patient stay? (2) Does COPD severity and/or age influence the protocol type's effect on hospital stay? (3) Is 30-d patient readmission associated with therapy protocol type?

### Methods

After gaining approval from our institution's institutional review board, we conducted a retrospective medical record review of subjects with COPD who were hospitalized between 2007 and 2012 with the diagnosis of acute bacterial pneumonia. The following ICD-9 (International Classification of Diseases, 9th Revision) codes were used

### QUICK LOOK

#### Current knowledge

Respiratory therapy (RT) protocols are based on published evidence-based clinical practice guidelines. Protocols have been shown to standardize patient care and allow respiratory therapists to deliver appropriate, timely care without waiting for a physician order.

#### What this paper contributes to our knowledge

Respiratory care delivered by respiratory therapist-driven protocols did not confer a disadvantage to subjects in terms of hospital stay compared with physician-directed treatment. Treatment efficacy was not sacrificed regardless of disease severity, and 30-d post-discharge readmission rates were lower under respiratory therapist-driven protocols.

to identify subjects: 481, 482 and subsets, 483 and subsets, 491, 21, and 496. The medical record search was designed to exclude mechanically ventilated patients and patients who were transferred to the transitional care or rehabilitation unit; a total of 320 medical records were identified.

Information gathered included gender, age, RT treatment status (protocol RT vs non-protocol RT), hospital stay, 30-d readmission (yes or no), and a severity of illness index. Thirty-day readmission was determined by manually checking discharge and readmission dates. RT treatment status was ascertained by knowledge of the ordering physician's identity. (At our institution, physicians either subscribe or do not subscribe to RT protocols; a list of subscribing and non-subscribing physicians is kept in the hospital's respiratory care department. For pertinent sections of our adult RT protocol, see the supplementary materials at <http://www.rcjournal.com>.) Of the 320 records identified, only 245 had complete data sets. One subject's record was removed as an extreme outlier. Of the 244 remaining subjects, 162 (66%) received protocol RT, and 82 (34%) received non-protocol RT. We used a univariate 3-way analysis of variance (protocol type  $\times$  age  $\times$  COPD severity) with pairwise post hoc comparisons and a chi-square test of independence to answer our research questions.

The COPD severity of illness index is an integral component of the All Patient Refined Diagnosis-Related Group system, which classifies patients according to the chief complaint on admission, severity of illness, and risk of mortality.<sup>12</sup> The assigned severity of illness or risk of mortality subclass is dependent on the patient's underlying problem and the number of coexisting serious diseases or illnesses present; that is, severity of illness and risk of mortality assignments depend on a patient's comorbidities,

age, principal diagnosis, and medical procedures performed. High severity of illness and risk of mortality levels are associated with multiple comorbidities and their interactions. Four severity of illness and risk of mortality categories numbered sequentially from 1 to 4 indicate minor, moderate, major, and extreme severity of illness and risk of mortality, respectively.

To ensure an adequate number of cases in each category, we combined disease severity scores to create a dichotomous variable; subjects with severity scores of 1 and 2 formed one group, and subjects with scores of 3 and 4 formed a second group. The same method was used to group subjects into 2 age categories:  $\leq 70$  y and  $\geq 71$  y. Eighty-nine subjects were  $\leq 70$  y old and 155 subjects were  $\geq 71$  y old.

### Results

There were no significant interaction effects among the independent variables (protocol, age, and disease severity) on hospital stay. In addition, there were no significant effects of protocol type ( $P = .41$ ) or age ( $P = .85$ ) on hospital stay in our subject sample. The absolute nonsignificant difference for protocol on hospital stay was a mean of 0.76 d (95% CI 1.06–2.58), and the absolute nonsignificant difference for age on hospital stay was a mean of 0.175 d (95% CI 1.65–1.2). As expected, there was a significant effect of disease severity on hospital stay ( $P = .005$ ). The absolute significant difference for the effect of disease severity on hospital stay was a mean of 2.59 d (95% CI 0.77–4.41).

A chi-square test for independence was performed to determine whether readmission to the hospital within 30 d of discharge was independent of respiratory care protocol type. Protocol RT was significantly associated with fewer 30-d readmissions ( $P = .02$ ) compared with non-protocol RT. A total of 213 subjects avoided hospital readmission in the first 30 d following discharge; of these subjects, 147 (69%) received protocol RT, and 66 (31%) received non-protocol RT.

Of the 162 subjects receiving protocol RT, 15 were readmitted within 30 d of discharge, for a readmission rate of 9.3%. Of the 82 subjects receiving non-protocol RT, 16 were readmitted within 30 d, for a readmission rate of 19.5%.

### Discussion

In this sample of 244 subjects, neither the type of protocol (therapist-directed or physician-directed) used nor the age of the subject had a significant effect on hospital stay. Because treatment is generally timelier when RT protocols are used, one could reasonably speculate that RT protocols would be associated with a shorter hospital stay;

however, in this study, the type of RT delivery did not affect hospital stay. There were also no significant interaction effects between protocol type and COPD severity; that is, regardless of severity level, the protocol type did not affect hospital stay. As expected, greater disease severity significantly affected hospital stay. Overall, the results show that regardless of disease severity, treatment efficacy was not sacrificed when RT was directed by respiratory therapists rather than by physicians.

In this study, 30-d readmission frequency was not independent of protocol type. Only 9.3% of COPD subjects experiencing acute pneumonias were readmitted if they were placed on protocol RT, whereas 19.5% of subjects given non-protocol RT were readmitted within 30 d. However, the majority of subjects in our sample (162 of 244 subjects) received protocol RT; caution must be used in attributing the lower 30-d readmission rate to protocol RT use. However, because the absolute number of subjects readmitted in the smaller physician-directed RT group was greater than the absolute number readmitted in the much larger therapist-directed RT group (16 vs 15 readmissions, respectively), it is reasonable to speculate that protocol RT may have had a beneficial effect on subject readmission rates. One wonders if the subjects receiving physician-directed RT had more severe disease than the subjects receiving therapist-directed RT; this is unlikely because hospital stay was not affected by protocol type, regardless of disease severity.

Previous studies have shown that RT delivered by protocol is beneficial in several ways, including cost savings, hastened mechanical ventilation weaning times, reduced time spent in intensive care, and reduced number of subjects returning to the ICU because of complications.<sup>4,7,8</sup> In addition, Tramacere et al<sup>11</sup> showed that RT delivered by protocol results in more timely implementation of therapy. To our knowledge, no previous studies have addressed the effect of therapist-directed protocols on 30-d readmission rate and hospital stay for COPD subjects.

### Limitations

Retrospective studies do not allow for random assignment to treatment groups or active control of confounding variables; causal relationships cannot be definitively established. It is possible that a comparison of 30-d readmission frequencies between physician-directed and therapist-directed groups would yield different results if the groups were more comparable in size.

### Conclusions

In our study, protocol RT did not confer a disadvantage to subjects in terms of hospital stay compared with non-protocol RT. Overall, the results show that treatment ef-

ficacy was not sacrificed when RT was directed by respiratory therapists rather than by physicians, regardless of disease severity. In addition, the results suggest that therapist-directed protocols may have been of some benefit in reducing 30-d post-discharge readmissions.

**ACKNOWLEDGMENTS**

We thank Michael G Parker PhD PT (University of Mary, Bismarck, North Dakota) for his assistance with statistical analysis.

**REFERENCES**

1. American Association for Respiratory Care. Guidelines for respiratory care department protocol program structure. Ford version 11. 10.2008. <https://www.aarc.org/resources/professional-documents/whitepapers/protocol-program-structure/> Accessed July 17, 2014.
2. Stoller JK, Mascha EJ, Kester L, Haney D. Randomized controlled trial of physician-directed versus respiratory therapy consult service-directed respiratory care to adult non-ICU inpatients. *Am J Respir Crit Care Med* 1998;158(4):1068-1075.
3. Rose L, Nelson S, Johnston L, Presneill JJ. Decisions made by critical care nurses during mechanical ventilation and weaning in an Australian intensive care unit. *Am J Crit Care* 2007;16(5):434-443.
4. Hermeto F, Bottino MN, Vaillancourt K, Sant' Anna GM. Implementation of a respiratory therapist-driven protocol for neonatal ventilation: impact on the premature population. *Pediatrics* 2009;123(5):e907-e916.
5. Koch R. Therapist driven protocols: a look back and moving into the future. *Crit Care Clin* 2007;23(2):149-159.
6. Ely EW, Bennett PA, Bowton DL, Murphy SM, Florance AM, Haponik EF. Large scale implementation of a respiratory therapist-driven protocol for ventilation weaning. *Am J Respir Crit Care Med* 1999;159(2):439-446.
7. Kollef MH, Shapiro SD, Clinkscale D, Cracchiolo L, Clayton D, Wilner R, Hossin L. The effects of respiratory therapist-initiated treatment protocols on patient outcomes and resource utilization. *Chest* 2000;117(2):467-475.
8. Kallam A, Meyerink K, Modrykamien AM. Physician-ordered aerosol therapy versus respiratory therapist-driven aerosol protocol: the effect on resource utilization. *Respir Care* 2013;58(3):431-437.
9. Parker A, Liu X, Harris A, Smith R, Reynolds M, Shanholtz C, Netzer G. Respiratory therapy organization changes result in increased respiratory care resource utilization in a tertiary care medical intensive care unit. *Chest* 2010;138(4\_MeetingAbstracts):766A. doi: 10.1378/chest.10451.
10. Pikarsky RS, Acevedo RA, Farrell T. Medical errors reduction using respiratory care protocols. *Chest* 2009;136(4\_MeetingAbstracts):62S. doi:10.1378/chest.136.4\_MeetingAbstracts.62S-e
11. Tramacere A, Rizzardi R, Cilione C, Serri B, Florini F, Lorenzi MC, Clini E. Effects of respiratory therapist-directed protocol prescription and outcomes of pulmonary rehabilitation in COPD inpatients. *Respiration* 2004;71(1):60-65.
12. 3M Health Information Systems. An overview of 3M all patient refined diagnostic related groups (3M APR-DRG). [http://www.medicaid.ms.gov/wp-content/uploads/2014/03/100112\\_3M-Presentation.pdf](http://www.medicaid.ms.gov/wp-content/uploads/2014/03/100112_3M-Presentation.pdf). Accessed July 17, 2014.

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