

## **Continuous Lateral Rotation Therapy (CLRT): Development and Implementation of an Effective Protocol for the ICU**

### **Submitted by:**

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A study conducted by the Medical Center of Central Georgia found that implementation of CLRT (Continuous Lateral Rotation Therapy) protocols was instrumental in improving patient outcomes, reducing hospital and Critical Care length of stays, and providing significant cost savings. Data gathered from the study were compared to a non-CLRT control group drawn from hospital history. Patients were stratified into those whose therapy was initiated within 48 hours of intubation or meeting criteria of the ICU, and those who received CLRT after 48 hours from intubation or meeting criteria. Results of patients who received CLRT within 48 hours of admission (Hill-Rom's TotalCare SpO<sub>2</sub>RT. Pulmonary Therapy System) included reduced hospital and critical care lengths of stay, reduced ventilator days, and reduced re-admission and re-intubation rates. The Medical Center of Central Georgia benefited from significantly improved cost/reimbursement margins and return on investment.



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## Background

The benefits of Continuous Lateral Rotation Therapy (CLRT) to intubated critical care patients have been well documented in the literature.<sup>1,2,3,4,5</sup> The literature has shown that patients receiving CLRT are less likely to contract nosocomial pneumonia and other pulmonary complications, and their re-admission rates are lower than patients who do not receive the therapy. Moreover, CLRT reduces both critical care and hospital length of stay, decreases ventilator days, and reduces overall cost of treatment.

Despite its obvious medical and fiscal advantages, CLRT is not applied in all cases where its benefits could be realized. Integration of the therapy into many institutions' continuum of care has been inconsistent. There are several reasons for this:

- The lack of a standard CLRT protocol in many care centers for identifying an appropriate patient population.
- Lack of information among care givers about the long-term physiological effects of CLRT.
- Difficulty obtaining a physician's order for CLRT therapy in a timely manner.
- Difficulty of moving ventilated patients to rotational beds and repositioning them during therapy as needed.

The Medical Center of Central Georgia in Macon, Georgia, is a 600-bed, not-for-profit, community hospital with four adult ICUs totaling 54 beds. In assessing the rate of CLRT implementation in the hospital's critical care units, it was found that most of the reasons listed above applied: no protocol existed; nurses and therapists lacked knowledge about the therapy's benefits and were reluctant to initiate it without physician approval; the process of getting patients into the rotational beds was cumbersome and time consuming.

The Medical Center of Central Georgia pursued an initiative designed to make the benefits of CLRT available to all patients who proved to be candidates for the therapy.

## CLRT... A Different Perspective

The literature on CLRT emphasizes degree of patient rotation as the critical factor in delivering the therapy's benefit.<sup>2,5</sup> In 2002, the Medical Center of Central Georgia was introduced to Hill-Rom's TotalCare SpO<sub>2</sub>RT® Pulmonary Therapy System, which approached CLRT from a different perspective. Rather than degree of rotation, the Hill-Rom technique focused on early therapy initiation (within 48 hours of intubation) and continuous rotation (no less than 18 hours/day) set at a percentage of the bed's total arc.

The Medical Center of Central Georgia was afforded the opportunity to assess the impact of protocol implementation on continuous lateral rotation therapy with the TotalCare SpO<sub>2</sub>RT® bed. This presented the nursing and respiratory therapy staff with an opportunity to develop and initiate a set protocol for CLRT and to conduct a study to analyze the results of consistent, protocol-driven CLRT.

### An opportunity

At the time that the Hill-Rom® system became available, the ICUs at the Medical Center were undergoing restructuring. The unit associated with open heart surgery was to be equipped with 20 new TotalCare SpO<sub>2</sub>RT® bed systems from Hill-Rom. This presented the nursing and respiratory therapy staff with an opportunity to develop and initiate a set protocol for CLRT, and to conduct a study to determine if the protocol (which stipulated early implementation of continuous lateral rotation therapy) would yield results comparable to those already in the literature.

The team chosen to develop the protocol realized that the "hassle factor" was a primary obstacle to early CLRT implementation and implementation of the therapy in general. Moving a critically ill patient from one bed to another is a difficult task and care givers may feel the effort and risk involved outweigh the potential results. A TotalCare SpO<sub>2</sub>RT® bed system from Hill-Rom does not require a patient to be moved to a special therapy bed nor does it require a change of mattress for therapy to begin. The bed is converted into a CLRT unit simply by inserting a rotation therapy module, eliminating time-consuming and potentially risky patient transfers from bed to bed – transfers that also carry the risk of injury to the caregiver.

## Developing the protocol

Developing a protocol was key to realizing the full benefits of CLRT and to providing usable data for a proposed study of the effectiveness of this type of CLRT. The nursing staff and respiratory therapists worked together and developed guidelines for implementation of CLRT in pulmonary patients with high risk of developing pulmonary complications.

The proposed protocol underwent review by the Medical Center's Medical Executive Board, the body which approves all medical activities undertaken within the hospital. Since implementation of the protocol would not require a physician's approval, the Medical Executive Board's acceptance was crucial to the success of the program. Without it, CLRT could only be initiated with physician approval, a process that might cut into the vital 48-hour window during which optimum results might be achieved.

The comprehensive protocol clearly spelled out the steps necessary for implementing, maintaining and discontinuing CLRT. These steps included:

- Identification and evaluation of potential candidates for CLRT. Patients undergo an initial evaluation using a Pulmonary Risk Assessment Predicus Tool consisting of twelve criteria. By meeting five of these criteria, a patient becomes a candidate for CLRT. Additional factors such as  $\text{FiO}_2$  of 50% or higher for one hour, PEEP (Positive End Expiratory Pressure) of 8 or higher and P/F ratio of less than 300 also qualify a patient for rotation therapy. On-going evaluation during the course of CLRT is also mandated in this section of the protocol.
- Initiating CLRT spells out when CLRT is to commence and clearly defines contraindications for the therapy.
- Maintaining CLRT defines guidelines for assessing patient tolerance of CLRT and suggests interventions for potential adverse effects of the therapy.
- Documentation of CLRT specifies information about the therapy that is to be included in the patient's information database. This information includes percent of rotation, hours of rotation in every 24-hour period, and the patient's progress toward expected outcomes.

- Criteria for discontinuing CLRT identifies criteria for discontinuation of the therapy.

*(See appendix A for the complete protocol.)*

Not all patients at risk for pulmonary complications are candidates for CLRT (contraindications include spine injury, bone fractures requiring traction, and certain head and neck injuries). Fortunately, the team had included in their protocol clearly delineated exclusion criteria that spelled out which patients were categorically excluded from receiving the therapy and which patients would require physician review and approval to receive the therapy. The protocol was approved, as was the research proposal, and the team began protocol implementation.

## The importance of education

Asking a nursing staff to implement CLRT as a matter of course is easy. Making sure it happens is more of a challenge. Patients undergoing CLRT do not exhibit immediate improvement in their condition. Consequently, setting up and initiating the therapy may seem like a futile exercise for nursing staffs already stretched thin. The team realized that simply handing out the protocol and hoping for full compliance was an unrealistic expectation. Buy-in and education, they knew, would drive success.

From the very beginning staff input was solicited in developing the protocol. In this way, a process was devised that would work for everyone. The finished protocol was the result of collaboration, with ownership spread among the entire staff.

Since the effects of CLRT are not immediately obvious, it is important that nurses and therapists understand the physiology of what happens during rotation therapy. To accomplish this, the protocol team set up education sessions to help nurses gain a better understanding of pulmonary function, how it can be compromised, and how lateral rotation therapy aids the recovery process. By giving staff members a clear picture of why they are being asked to initiate CLRT, they began to realize the difference that this therapy can make in a patient's recovery.

Ongoing education and reinforcement were major contributors to the program's success. Clinical managers made periodic rounds to review and evaluate implementation procedures with the staff. If patients met protocol criteria but had not yet been placed on CLRT, the cases were evaluated with staff members and, when appropriate, CLRT was implemented. Through these regular reviews, the protocol was reinforced and became standard operating procedure in the ICUs.

The introductory education sessions and follow-up reinforcement procedures are now part of the training regimen for new nurses and respiratory therapists joining the team at the Medical Center.

### **Preliminary study results**

A little over a year after implementing the CLRT protocol, enough data had been amassed to draw some preliminary conclusions on the effectiveness of continuous vs. angle-specific therapy, early therapy implementation (<48 hours), and the TotalCare SpO<sub>2</sub>RT<sup>®</sup> Pulmonary Therapy System from Hill-Rom.

Data gathered from the study were compared to a non-CLRT control group drawn from hospital history. Patients were stratified into those whose therapy was initiated within 48 hours of intubation or meeting criteria of the ICU, and those who received CLRT after 48 hours from intubation or meeting criteria. Preliminary results are remarkable. For patients who received CLRT within 48 hours of admission:

- Total average hospital length of stay was reduced
- Total days in critical care were reduced
- Average days on a ventilator was reduced
- Readmission rate to critical care was reduced, as was the re-intubation rate

The Medical Center of Central Georgia benefited from:

- Significantly improved cost/reimbursement margins
- Significant return on investment

Complete study results will be submitted to a peer review journal for publication.

### **Conclusion**

The medical and financial benefits of initiating CLRT within 48 hours of intubation and meeting criteria for CLRT are clear. However, many hospitals do not have the mechanisms in place to implement the therapy.

An essential part of consistent CLRT implementation is a detailed protocol that requires physician approval only for certain excluded cases. The protocol should be drafted with input from key nursing staff members and be supported with a strong education and training component that includes ongoing reinforcement and interaction with staff.

Ease of initiation is critical to consistent and timely implementation of CLRT. Moving a ventilated patient from an ICU bed to a rotation therapy bed can be a delicate and time-consuming process that often presents risks for the patient as well as the care givers involved. By having in place, either through purchase or rental, versatile beds that require only the insertion of a rotation therapy module, the "hassle factor" associated with time and effort needed for patient transfer is reduced, the risk of injury decreases and therapy can begin sooner, directly impacting length of stay and patient outcomes.

Together, proper equipment, aggressive protocols and a well-informed staff result in better patient care and more cost effective treatment.

### **References**

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- <sup>2</sup> Basham K, Vollman K., Harris E. Continuous Lateral Rotational Therapy: When Is It Right for Your Patient? *American Journal of Nursing* (supplement) June, 1995.
- <sup>3</sup> Raof S., Chowdhrey N., Raof S., Feuerman M., King A., Sriraman R., Khan F. Effect of Combined Kinetic Therapy and Percussion Therapy on the Resolution of Atelectasis in Critically Ill Patients. *Clinical Investigations in Critical Care*, June, 1999.
- <sup>4</sup> Choi S., Nelson L.D. Kinetic Therapy in Critically Ill Patients: Combined Results Based on Meta-Analysis. *Journal of Critical Care*, Vol. 7, No. 1 (March), 1992: pp 57-62.
- <sup>5</sup> McKay C. Best Practices: Reducing Nosocomial Pneumonia. *RN* (supplement), February 1999.

# **Appendix A**

## **Continuous Lateral Rotation Therapy Protocol**

### **Medical Center of Central Georgia**

#### **Department of Critical Care**

#### **Subject**

Continuous Lateral Rotation Therapy (CLRT).

#### **Scope**

All personnel providing direct patient care. The MD, RN and RRT are jointly responsible for identifying patients who may benefit from this therapy.

#### **Purpose**

The purpose of this policy is to delineate guidelines for the implementation of CLRT (Continuous Lateral Rotation Therapy) in pulmonary patients with high risk for development of pulmonary complications.

#### **Rationale**

Research has shown that continuous, side to side (lateral) rotation of patients at risk for pulmonary complications (intubated, ventilated, PMH of chronic pulmonary disease, pneumonia and other problems) helps to reduce intubation time, ventilator time, ICU length of stay and overall length of stay in the hospital, as well as, helps prevent the development of atelectasis, nosocomial pneumonia and other complications of intubation and mechanical ventilation.

#### **References**

For bed operation, please consult appropriate User Manual for the rotational product being used.

#### **Policy Statement**

A physician's order is NOT required to initiate continuous lateral rotation therapy, unless the patient has contraindications or potential contraindications to therapy. If these conditions exist, a physician's order is required to initiate therapy.

## Guidelines

### Identification and Evaluation of potential candidates for CLRT Therapy:

1. Each patient admitted to critical care will be evaluated for potential pulmonary complications utilizing the Predicus Tool (see Addendum A). This evaluation will occur at the following times, as appropriate for each patient.
  - Upon admission
  - Upon intubation
  - 12-18 hours post Open-Heart Surgery (Patient has not weaned and extubated as planned.)
  - The Predicus Score will be documented on the treatment record and/or critical care flowsheet as appropriate.
2. All critical care RNs and RRTs will evaluate intubated patients on a continual basis to determine if any of the following criteria have been met:
  - Requires  $FiO_2$  of 50% or greater for longer than 1 hour (Exception: Neurologic patients who are on high levels of  $O_2$  for brain oxygenation purposes only and not for pulmonary and/or arterial oxygenation problems, these patients must maintain a P/F ratio of >300)
  - Requires PEEP of 8 or higher
  - Has a P/F ratio of less than 300. (P/F ratio =  $PaO_2/FiO_2\%$ )
3. A patient will be considered a candidate for CLRT if ANY of the following conditions are met.
  - Predicus score of 5 or more
  - $FiO_2$  of 50% or higher for 1 hour or more (see neuro exception above)
  - PEEP of 8 or higher
  - P/F ratio of less than 300

### Initiating CLRT Therapy

4. If the patient meets criteria for initiation of CLRT, the patient will be started on CLRT unless contraindications or potential contraindications exist. An MD will be consulted regarding initiation of CLRT in these patients.
5. Patients with unstable spines are contraindicated for the TotalCare SpO<sub>2</sub>RT® bed. They may be treated with other table-based rotational beds, if desired.
6. The following patients should NOT receive CLRT (CLRT is CONTRAINDICATED)
  - Long bone fractures/traction
  - Unstable intracranial pressure ( > 20 mmHg )
7. CLRT must be used with caution in the following patient populations. (Each patient's situation should be evaluated individually, and an MD order is required to initiate therapy.)
  - Extreme agitation and/or motion sickness uncontrolled with sedation and/or treatment
  - Immediate (1st 12 hours) post-operative period following open heart surgery
  - Multiple rib fractures
  - Bronchospasm
  - Uncontrollable diarrhea
8. The goal is to initiate CLRT therapy within 24 hours of identification of the patient as a candidate for therapy.

9. Use the training mode to transition the patient to therapy as needed. The TotalCare SpO<sub>2</sub>RT® bed will start the rotation at 1/2 the rotation entered and increase it in hourly increments until the goal rotation is reached.

10. Settings for the TotalCare SpO<sub>2</sub>RT® Pulmonary Therapy System:

Rotation:

- Minimum = 70% turn
- Ideal/Goal = 100% turn
- Patient should be rotated to maximum amount tolerated

Pause Times:

- 30 seconds to each side and center

**Maintaining CLRT Therapy:** (Assessing tolerance of therapy and interventions for potential adverse reactions)

11. Every effort should be made to maintain rotational therapy at all times. The goal is to rotate the patient a MINIMUM of 18 hours per day.

12. Physiologic changes (such as a drop in hemodynamics, blood pressure or oxygen saturation) during rotation can be evaluated and managed as follows:

**Drop in O<sub>2</sub> Saturation:**

- Assess the level of desaturation when the "bad" lung is down.
- Consultation between team members (including physician) to determine what level of desaturation is acceptable for the patient.
- Check the pulse oximetry waveform for adequacy and appropriate tracking.
- Vary pause times, decreasing pause time on side where desaturation occurs, and increasing the pause time on the side where saturation is better.
- Allow 5-10 minutes to see if saturation drop is transient.
- Increase the frequency of ET suctioning. Rotation will mobilize large amounts of stagnant secretions.
- Review CXR with other team members for clinical explanations for desaturation and potential interventions.
- Reacclimate the patient to the rotation and/or decrease the degree (percent) of rotation if other measures fail.
  - REMEMBER, over time, saturation levels should IMPROVE with rotation, it is VERY important that rotation be maintained.

**Change in Blood Pressure or other hemodynamic parameters**

- Evaluate filling pressures (preload i.e. CVP, PCWP and/or Jugular venous distension), determine adequacy of volume resuscitation/support.
- Evaluate cardiac performance (contractility: CO/CI if available, heart rate), determine adequacy of inotropic support.
- Evaluate for vasodilatory problems (i.e. any type of distributive shock pattern: neurogenic, septic or anaphylactic i.e. low diastolic BP and/or SVR/SVRi), determine adequacy of vasopressor support.
- REMEMBER, changes in hemodynamic status during rotation are due to alterations in the determinants of CO and NOT due to the rotation. Treat the problems identified as appropriate and maintain/resume rotation as quickly as possible.

## Documentation of CLRT

13. Documentation regarding CLRT should include:
- Percent of rotation patient is receiving
  - Number of hours rotation in the last 24 hours (use "statistics" on Bed)
  - Notation of how patient is progressing towards expected outcomes:
    - current pulmonary assessment
    - ABGs
    - P/F ratio

## Criteria for Discontinuing CLRT

14. CLRT therapy may be discontinued if any of the following conditions exist:
- Chest X-Ray shows improving, resolving infiltrates
  - Patient is extubated with stable ABG's or O<sub>2</sub> saturation stable for 24 hours
  - Patient is increasingly mobile, getting out of bed, turning self, requiring only moderate assistance
  - Paralytic and or sedative therapy has been discontinued
  - Patient has become vent dependent, but has stable hemodynamic and pulmonary status
  - Aggressive measures have been withdrawn
  - Patient has been on CLRT for 5 days and made no improvement
  - Patient is unable to be rotated for 18 hours/day

