

A Comparison of Non-Rotational and Rotational Interventions

Stanford University, Stanford, CA

STUDY RESULTS

INTRODUCTION

Continuous Lateral Rotation Therapy has been used for years to keep immobilized patients in motion. Prolonged inactivity produces sequelae in many systems of the body. Research has shown that Continuous Lateral Rotation Therapy (CLRT) may result in fewer days of bed confinement, decreased incidence of pneumonia, decreased atelectasis or respiratory complications, decreased ICU and hospital LOS, and fewer days of mechanical ventilation. *See Appendix 1: The Bibliography.*

THE CHALLENGE

The Critical Care Clinical Nurse Specialist at Stanford University Hospital, a large teaching institution in Northern California, believed that CLRT would benefit specific patient populations in her 24 bed M/SICU. The unit currently utilized a standard low airloss product to manage skin related complications of immobility. However, based on clinical research, it was felt that utilization of a low airloss based rotational product would bring added patient benefits.

This information was shared with the Director of Nursing for Stanford University Hospital. The DON recognized the potential benefit but felt they should conduct an internal program to document their specific results.

The challenge then became to organize and implement an internal program that would document the direct clinical benefits of utilizing Continuous Lateral Rotation Therapy. The CNS contacted Hill-Rom and together a program was put into action.

PROGRAM PURPOSE

To document the direct patient benefits resulting from utilization of Continuous Lateral Rotation Therapy.

The positive clinical outcomes documented from

the Internal process would provide the basis for making Continuous Lateral Rotation Therapy a standard form of care for a select group of patients at Stanford University Hospital.

METHODOLOGY

A comparative format was used where quality outcomes data on patients receiving Continuous Lateral Rotation Therapy (EFICA CC® Dynamic Air Therapy® Unit) was compared to baseline outcomes data collected on a similar control group of low airloss, non-rotational patients. This was completed in a retrospective and prospective manner. The retrospective group were those who received Continuous Lateral Rotation Therapy.

Fifty patients were studied; twenty-five received standard low airloss therapy and twenty-five received therapy on a low airloss based rotational product. The program continued until twenty-five patients had been entered into each group.

THE PROCESS

PHASE 1: Situation Analysis

The Critical Care Clinical Nurse Specialist along

- **Limited CLRT utilization**
- **High MC3 utilization**
- **Inconsistent outcomes**
- **No protocol process**
- **No outcomes tracking**

with the M/SICU Medical Director and Hill-Rom consultants began the initial step with an assessment of the current CLRT utilization process. This analysis showed very limited use of continuous turning products, but a high utilization of standard low airloss beds regardless of the pulmonary situation. It was noted that no formal

process for CLRT utilization, management or outcomes tracking was in place. This combination of factors led to inconsistent outcomes when a CLRT product was utilized.

PHASE 2: Plan Development

The CNS began the program with a core group of

- ***Establish the core team***
- ***CFO involvement***
- ***IRB process***
- ***Protocol development***
- ***Approach Medical Director & nursing***

people who were committed to the project. She included the facility's key clinical and financial decision makers during the initial program definition. This step facilitated an understanding for all involved of the purpose, goals, outcomes and standards of care to be derived from this program. The CNS worked with the DON, CFO, hospital IRB, M/SICU Nurse Manager and the M/SICU Medical Director. The staff members who were involved in daily project work were those working to achieve progression up the staff nurse clinical ladder. Hill-Rom consultants were part of the core team.

A formal Internal Review Board (IRB) proposal was drafted by the CNS and presented for review. A time line of approximately nine months was outlined for the project. The IRB proposal included the process and methodology the program would follow and detailed the information for the data collection tool.

Based on information from the initial assessment, work began on developing a well defined CLRT protocol that focused on placement criteria, patient management and step-down criteria. Protocol examples from other hospitals as well as clinical research studies were reviewed. Upon completing the first draft protocol it was reviewed by the M/SICU Medical Director and members of the nursing staff. Feedback was obtained, changes were made and a protocol was established. See *Appendix 2: CLRT Protocol*.

PHASE 3 & 4: Implementation and Measurement

Education was the main focus for this phase of the

program. Hill-Rom worked closely with the CNS to

IMPLEMENTATION

- ***Education – product, concept, data collection***
- ***Protocol implementation***
- ***Daily pulmonary rounds***
- ***Data collection – retrospective/prospective***
- ***Product experts***

MEASUREMENT

Outcomes

- ***Pneumonia – development/resolution***
- ***ICU LOS***

Patient Management

- ***APACHE II score 10-25***
- ***EFICA CC® Unit LAG***
- ***EFICA CC® Unit LOS***
- ***Time per day not rotating***
- ***Braden Scale***

provide both CLRT product and concept education. Background information taken from the clinical research studies was provided for the staff. Education was provided on the new CLRT protocol as it was implemented. The data collectors were trained and oriented to the process. M/SICU staff were also educated in terms of maintaining proper rotation and collecting therapy statistics summary information.

Daily pulmonary rounds were initiated. The CNS, Hill-Rom and key staff members completed rounds on all M/SICU patients. The pulmonary rounds facilitated bedside staff education and assessment of protocol compliance.

Hill-Rom worked to develop in-house CLRT experts; staff members on all shifts who could be internal resources. A 6 hour CEU program was developed and provided for 12 M/SICU staff members.

Upon completing staff education, retrospective and prospective data collection began. Retrospectively,

APPENDIX 3



**DATA COLLECTION TOOL
LOW AIRLOSS THERAPY:
A Comparison of Rotational and Non-Rotational Interventions**

Pt I.D. Stamp/Label

PI: Kathryn M. LaGrange, R.N., M.S., CCRN
 2) Admitting Diagnosis: _____

 3) Admission Weight: _____
 4) Systems Involved: _____

5) Date/Time of Hosp. Admit: _____
 6) Date/Time to ICU: _____
 7) Date/Time of Enrollment (onto bed): _____
 8) Date/Time of Exit: _____ Exit Code: _____
 9) APACHE II within 1st 24 hrs. of admit to ICU: _____
 10) APACHE II @ Exit: _____

Exit Code: 1 = Criteria Failure (specify); 2 = Exit ICU; 3 = Mortality

ICU DAY #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Pneumonia (Y,N)															
2. Vented Days (Y,N)															
3. Braden Score															
4. Minutes per day not rotating															
5. Minutes per day percussing															
6. Bed type (E, M)															
7. Paralysis/Sedation (Y, N)															
8. Data collected by															

Inclusion Criteria (when to rotate)

- ETT and Mechanical Ventilation
- One or more system failure
- Real or expected immobility
- Expected to be in ICU > 24 hours
- Intolerant of manual turning

Exclusion Criteria (when not to rotate)

- Actual or potential ↑ in ICP (> 20 mmHg) (neuro changes, neuro deficit, ICP monitor in place)
- Posterior flap or graft
- Unstable spine or skeletal tx.
- Unexpected cardiac dysrhythmias

Instructions

- 1) Stamp with patient's name.
- 2) Record admitting diagnosis from face sheet
- 3) Record admit weight or first recorded weight from flowsheet
- 4) Determine which systems are being supported/have failed (look at patient or ask RN).
- 5) Record date/time of hospital admit from face sheet.
- 6) Record date/time of ICU admit from flowsheet.
- 7) Record date/time patient placed onto specialty bed (on flowsheet or ask RN or Hill-Rom).
- 8) When patient is removed from bed, record date/time. Determine cause for coming off bed, note this in "exit code" area (see exit codes and exclusion criteria).
- 9-10) Determine APACHE II score at admit to ICU and when bed removed (available from Hill-Rom).

Collect data (at same time everyday):

ICU Day #1 = Admission Day.

- 1) Determine via progress notes or CXR report if patient has pneumonia. Enter "Y" for yes and "N" for no. Count how many days patient has been on mechanical ventilation. Enter these two pieces of data in box for that day.
- 2) Check each day patient intubated. V = vented.
- 3) Enter Braden Score (see instructions in red data collection binder).
- 4) Determine from bed software (only on EFICA CC® Unit) how many minutes patient did not rotate in the last 24 hours. If not on EFICA CC® Unit, how many times was patient turned?
- 5) Determine from bed software (only on EFICA CC® Unit) how many minutes patient received percussion and vibration in the last 24 hours.
- 6) Enter bed type (E = EFICA CC® Unit - pink surface; M = MC3 - blue surface).
- 7) Enter Y or N if patient paralyzed/sedated.
- 8) Enter your initials in box as data collector.

charts were pulled on the most recent patients placed on a standard low airloss bed in the M/SICU. An APACHE II score was calculated using chart information reflected in the first 24 hours of M/SICU admission. If the APACHE II score was between 10-25 the chart information was then assessed using the CLRT protocol criteria for placement. If the patient would have been a candidate for CLRT the remaining outcomes criteria was collected. Prospectively all patients admitted to the M/SICU were assessed upon admission for CLRT placement via the protocol and APACHE II scoring. All patients who met the CLRT criteria were placed on a continuous turning product and a data collection form was completed.

Some of the initial patient data collected prospectively had to be discarded when the daily pulmonary rounds found they were not being managed according to the established protocol. This process of data collection was continued until each group, CLRT and non-CLRT, contained information on twenty-five patients. The data for both the retrospective and prospective groups was collected by staff members working to move up the clinical staff ladder. See Appendix 3: Data Collection Tool.

PHASE 5: Outcomes Analysis

The CNS organized and compiled the data collected for both groups. She then compared the

- *Comparison of data groups*
- *Outcomes conclusions*
- *Staff education prn*
- *Pulmonary rounds continued*
- *Continued tracking of 4 key outcomes measures for future analysis*

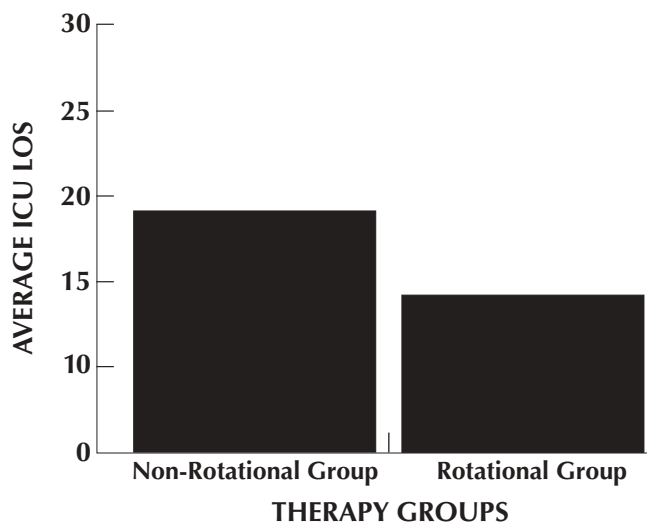
outcomes for each group and shared this information with key clinical financial decision makers as well as the core group.

In an effort to continue the work in progress it was

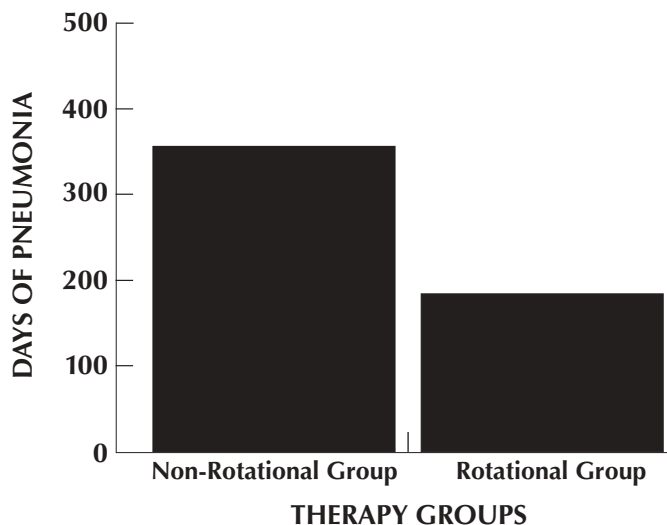
decided that pulmonary rounds should continue on a weekly basis, staff CLRT education should be repeated as needed and four outcomes measures should continue to be collected. They include CLRT product LAG and LOS as well as pneumonia development and ICU LOS.

CLINICAL OUTCOMES

Decrease in average ICU LOS: 5.2 days (26.8%)



Reduction in days of pneumonia: approximately 52%



Continuous Lateral Rotation Therapy will be a

CONCLUSION

standard of care for select patient populations (based upon protocol criteria). This standard of care is supported by the improved patient outcomes

documented during our outcomes process.

CONTRAINDICATIONS FOR CLRT

- Advanced lung CA or any other terminal illness
- Unstable spinal cord injuries
- Long bone or cervical traction
- Severe agitation
- Increased unstable dysrhythmias with manual turning
- Actual increase in ICP (>20mmHg)
- Posterior flap or graft

DISCONTINUE THERAPY

If patient shows no improvement towards treatment objectives in 7 days, consider discontinuing therapy. When considering discontinuing therapy, put the bed into standard mode for 24 hours; if the patient’s condition does not regress, step down to the appropriate bed surface.

STEP DOWN CRITERIA

Once the decision has been made to actively step a patient down, the criteria for the appropriate bed surface will be based on wound care protocols.

Pt I.D. Stamp/Label _____

Pt Dx: _____

Date on: _____ Date off: _____

INDICATIONS FOR DISCONTINUING CLRT THERAPY

Must answer Yes to at least three items below:	Fill in date and circle Yes or No							
	Date	Date	Date	Date	Date	Date	Date	Date
D/C Indications								
1. Improving, resolving infiltrates on CXR	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
2. ABG's or oxygen saturation consistently improving/stable	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
3. Increased mobility - assists with turning/turns self/gets out of bed	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
4. Ability to cough or mobilize secretions	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
5. D/C of neuromuscular blockers	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
6. D/C of vasoactive drip(s)	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
7. Hemodynamics are stable with manual turning	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
8. Constant head of the bed elevated ≥ 30°	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
9. Any impedance to rotation ≥ 18 in 24 hours	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
10. Patient is transferred out of the ICU (unless with ADN approval)	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
11. Increased unstable dysrhythmias	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no
12. Other (comment)	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no	yes/no

Comments: _____

APPENDICES

APPENDIX 1

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APPENDIX 2

EFICA CC® DYNAMIC AIR THERAPY® PROTOCOL Continuous Lateral Rotation Therapy (CLRT)

PURPOSE

The Efica CC® Unit is designed for those patients with real or potential accumulation of secretions in the lungs. The purpose of CLRT is to achieve aggressive pulmonary toilet for prevention and treatment of acute pulmonary insult. The goal of the therapy is to decrease ventilator days, incidence of nosocomial pneumonia, and potentially ICU length of stay. Therapy should include maximally tolerated rotation 18 out of 24 hours a day (a minimum of 10 times per hour).

BACKGROUND

These guidelines are consistent with published guidelines and recent medical research findings (see Appendix 1) and were reviewed by medical, respiratory and nursing clinicians.

INDICATIONS FOR PLACEMENT ONTO AN EFICA CC® UNIT

Must answer Yes to a minimum of three items below:	Circle Yes or No	
1. Patient is intubated.	Yes	No
2. Patient desaturates with turning.	Yes	No
3. Patient is immobile/exhibits ineffective mobility.	Yes	No
4. Patient is receiving neuromuscular blockage therapy.	Yes	No
5. Patient has difficulty mobilizing secretions.	Yes	No
6. Patient is ventilated with sepsis/pneumonia/ARDS.	Yes	No
7. Patient has multiple vasoactive drips with difficulty maintaining a stable blood pressure.	Yes	No
8. Patient is hemodynamically unstable with manual turning.	Yes	No
9. Patient has real or expected OR time of > than 8 hours.	Yes	No
10. Patient is expected to have an assist device post-op (e.g., LVAD/IABP).*	Yes	No

* Note: If patient is expected to be placed on an EFICA CC® Unit immediately post-op, order bed to be available at the OR.

CLRT PATIENT MANAGEMENT GUIDELINES

- Placement on bed within 24-48 hours of intubation or acute respiratory onset.
- Patient must be positioned in the center of the bed, with shoulders below the non-rotating head pillow.
- Rotate patient for 18 out of 24 hours a day to maximum tolerated angle for greatest benefit.
- Begin initial therapy with Rotation Training mode which starts rotation at 50% of maximum rotation desired and increase the degree of turn by 10% every hour. Assess patient tolerance with initiation of therapy and routinely thereafter.
- Use minimum pause time (0.5 minutes) tolerated by the patient.
- For very thick secretions, increase pause times - begin with 1.0 and increase as needed, not to exceed 5 minutes.
- At time of initial placement, begin education of patient and family members as to need, utilization and length of stay expectations on the EFICA CC® Unit.
- To manage patient agitation in response to CLRT:
 - a) educate patient
 - b) change degree of rotation and pause times
 - c) address sedation needs
- If rotation therapy is used to treat existing pulmonary complications, the first re-evaluation period will be the next designated day, not to exceed 7 days from initiation.
- A physician's order is needed for placement and discontinuing of the EFICA CC® Unit.
- In order for product to rotate, the HOB must be positioned $\leq 30^\circ$ (see sides of frame for head of the bed angle).

DOCUMENTATION:

- Document use of CLRT on the flow-sheet at the end of each shift:
 1. patient toleration
 2. % of rotation
 3. reason D/C from bed (see D/C indications)

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