



CCIS Overview 

An Overview of the Chronic Critical Illness Syndrome (CCIS) and Weaning the PMV Patient

Fall 2011

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CCIS Overview 

CCIS has been known for some time

HISTORICAL PRECURSORS INCLUDE:

- **SIRS** – Systemic Inflammatory Response Syndrome
- **MODS** – Multi-Organ system Dysfunction Syndrome
- These together describe CCIS-prolonged, rampant inflammation after acute critical illness that leads to progressive multi-organ dysfunction
- The use of the term "syndrome" implies that the manifestations are consistent and linked to the same underlying pathophysiology


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CCIS: Chronic Critical Illness Syndrome

- Represents a refinement of previous concepts and a better understanding of underlying pathophysiology
- This term was first used by multiple authors dealing with different aspects of the syndrome in 2002: *Critical Care Clinics of North America*
- The "experts" in the field are physicians who authored these seminal articles and are largely from Mt. Sinai Hospital in NY. They have had a specialty unit dealing with the largest subset of these patients (persistent mechanical ventilation) since the early '90s.


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Pathophysiology

- Acute Critical Illness has a physiologically defined time frame thought to be 7-14 days after the acute injury or illness
- In the acute phase, the Sympathetic Nervous System (SNS), Immune System and Adrenal-Endocrine System all increase their activity to maintain cardiac output and organ perfusion - this is now referred to as **Allostatic Response**. This response can be summarized as an Inflammatory Response.
- In the acute phase, these responses are **Adaptive**


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Acute Critical Illness Merging into CCIS

- The Allostatic Response, if not "turned off" by resolution of the underlying problem, becomes **Maladaptive** - this is referred to as **Allostatic Load or Burden**
- This change occurs between days 7-14 after the acute insult
- The very chemicals designed for initial survival in acute critical illness lead to the issues of CCIS

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Allostatic Load


CAN BE MAINTAINED BY:

- Failure to completely resolve the underlying problem
- The development of new issues keeping the adaptive systems revved up

FOR EXAMPLE:

- Patient continues to have GI Bleed
- Patient develops line sepsis after GI Bleed
- Either way the SNS, Immune System and Adrenal-Endocrine System remain in "hyper-drive" and Allostatic Load - the rampant Inflammatory Response remains high and organ damage continues

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Persistent Allostatic Load - Inflammation

- Leads to global tissue and organ damage
- The syndrome of CCIS is directly linked to the failure to “turn off” the initially adaptive responses of the SNS, Immune System and Adrenal-Endocrine System


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- Is the price organs and tissues pay for persistent Allostatic Load
- Results in **Survival without Recovery**


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Features of CCIS

- **Severe Nutritional Deficits** in which body is using own muscle for energy
- **Severe Endocrine Dysfunction** – the two issues that are treatable are Loss of Glycemic Control and Hypothyroidism
- **Bone Loss**
- **Delirium** and other mental health issues
- **Anasarca**-fluid overload
- **Bone Marrow Suppression**
- **Immune System Dysfunction and Exhaustion**
- **Polyneuromyopathy** (major contributor to ongoing respiratory failure)
- **Profound burden of suffering**
- **Wounds** and propensity for skin breakdown


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Types of Patients

- **Persistent Mechanical Ventilation Patients - our focus today.**
Defined in 2005 in CHEST as the need for six or more hours of vent support for 21 or more days
- Severe wounds
- Sepsis and Infectious Disease issues
- Multiple organ system dysfunction (including dialysis)
- Refractory Heart Failure
- Brain Injury requiring prolonged recovery

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Principles of Care

- Progressively reduce Allostatic Load by resolving underlying issues, preventing complications (which re-establish increased Allostatic Load), and targeting specific issues related to the syndrome
- Deteriorations in condition are quick and catastrophic - progress is fragile and made in very small increments
- Law of Unintended Consequences: Always must think into the future – many “standard” treatments for isolated issues in these patients result in worsening of another aspect of the syndrome and thus Increased Allostatic Load
- Artfully unravel the acute ICU interventions - these often contribute to maintaining Allostatic Load

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Organized Clinical Approaches

Manipulation of the ventilator is the least important aspect of successful weaning. Managing the elements of CCIS through standard approaches is critical. Anticipation and prevention of complications prevents further escalations of the inflammatory response.

STANDARD CARE PLANS:

- **Mobility:** Six levels and progressive with a focus on weight bearing - treatment for Weakness, Loss of Glycemic Control, Delirium and Bone Loss
- **Nutrition:** Dietician follows all patients, focus on uninterrupted calories, use of the gut and restoration of oral feeding
- **Endocrine Dysfunction:** Glycemic Control through use of subcu insulin; screen for hypothyroidism
- **Delirium:** Medication and Sedation reduction, Screen for Sepsis, Manage the restoration of circadian rhythms
- **Wounds:** PREVENT, treat existing wounds


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Organized Approaches Continued

- **Suffering:** Improve the Quality of Life - protocol includes pain, restoration of communication (speaking valve), family and faith access, oral feeding, restoration of continence, and managing delirium and depression
- **Anasarca:** Judicious diuresis, ultrafiltration(?), improved nutrition
- **Immune Exhaustion:** Prevent infection: CVC Line Bundle, VAP bundle, Antimicrobial Stewardship, Strict adherence to Transmission Precautions, LINES OUT

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Ventilator Management for the PMV Patient

Weaning PMV patients is not the sprint of SBTs in the Acute Care ICU. It is a marathon in which a skilled clinical team manages the syndrome of presenting symptoms and prevents complications. The RT is the central clinician on the team who focuses on progressive weaning trials. VAP reduction and Mobility are also principal responsibilities.

THE "3M" METHOD

- Maintain-Restore Nutrition
- Mobility
- Minimize Sedation
- Added to: RT Driven Weaning Protocols - allows for patient weaning when patient is ready and tolerant - allows for slow progressive wean - that is - "the marathon."


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RT Driven Weaning Protocol

- Must be approved and used by Pulmonologists
- Must be understood and implemented consistently and competently by the RT staff
- Must be clear and simple enough so that above can happen

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Protocol Content

There are many protocols with proven success. As a company, Select Medical weans 70+ percent of PMV patients with an average days to wean of <15. There are some basic principles of a successful protocol.

- Allow patient to sleep on AC or full support for first 24 hours
- Find method for "resting vent support." This could be AC, pressure support or even SIMV.
- Establish criteria for "ready to wean"
- Establish criteria for stopping the weaning trial
- Incremental and Progressive - each trial builds on the last
- Most often builds on "SBT" model by use of PSV
- Sleep at night on Resting Support

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Ready to Wean

HEMODYNAMICALLY STABLE:

- BP within normal parameters for patient
- No signs of Sepsis - look at daily sepsis screen
- Pulse WNL – generally > 60 < 100

PULMONARY STATUS: (should select no more than five)

- Requiring <50% FIO2
- PEEP ≤ 5
- O2 Sats ≥ 92
- Patient appears comfortable on ventilator
- Others: Spontaneous TV 3-5 l/kg of ideal body weight; Spontaneous Minute Volume > 5 l; RSBI - < 120


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Criteria to Stop a Session of Weaning

- Unstable vital signs: especially tachy or brady arrhythmias; hypotension, hypertension
- Patient exhausted - utilizing accessory muscles, etc
- O2 sat falls
- Goal met for session (?) - may decide to continue


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PMV CCIS Patients

- Are a distinct group from a physiologic standpoint than the acute critically ill patient population
- The model and venue of care needs to reflect the special needs of these patients and to treat them holistically in the context of CCIS
- A clinical team, anchored by the RT, knowledgeable in the care needs and strategies is vital to maximizing potential for recovery

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Select Medical has the Model and Venue of Care that provides an opportunity for both weaning the PMV patient and recovery beyond survival. These patients can and do return to their lives.

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