

Myxedema Coma Diagnostic Score

Michelle D. Lundholm, M.D.¹ ¹ Endocrinology, Diabetes and Metabolism, Cleveland Clinic

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Abstract

The myxedema coma diagnostic score integrates clinical and laboratory parameters to assist in identifying patients affected by this rare, life-threatening manifestation of severe hypothyroidism. Derived and validated retrospectively from institutional and literature cohorts, the score demonstrated high sensitivity (100%) and moderate specificity (85.7%) for diagnosing myxedema coma with a cutoff ≥ 60 . It is a practical diagnostic tool, but the score remains limited by small sample sizes and retrospective design, underscoring the need for further validation and cautious clinical application alongside endocrinology consultation.

I. HOW TO USE

When to Use

Use the myxedema coma diagnostic score¹ in patients with lab results consistent with severe hypothyroidism and clinical picture with depressed mental status concerning for myxedema coma (MC) that is not better explained by an alternative diagnosis. This calculator is not for use with mild hypothyroidism or asymptomatic patients.

PEARLS / PITFALLS

Always check thyroid function tests (thyroid stimulation hormone, TSH, and free thyroxine, T4 with or without total triiodothyronine, T3) when considering a diagnosis of MC. A normal or elevated free T4 or total T3 generally excludes MC. While there are some rare exceptions, most cases of MC have a significantly elevated TSH (generally >25 mIU/L, more often >50 mIU/L, with some TSH values even in excess of 100 mIU/L).

While the clinical features may vary widely, most experts agree that some degree of altered mentation is necessary to make a diagnosis of MC. To minimize subjective discrepancies in scoring, it is relevant to define the levels of central nervous system functioning. Somnolent or lethargic patients have a mild reduction in level of consciousness, typically appearing drowsy but easily aroused by gentle stimulation. Once awakened, they can maintain brief conversations and follow commands. Obtunded patients have a moderate reduction in consciousness, and

may require repeated or stronger stimuli to arouse. When awakened, they may be confused and respond slowly or incompletely to questions and commands. Stuporous patients have a marked impairment of consciousness, with a sleep-like state that is only arousable with painful or vigorous stimulation. Responses, if present, are minimal, delayed, and typically limited to simple movements or withdrawal. Finally, comatose patients have a complete loss of consciousness. They are unarousable with no purposeful responses or awareness of their environment.

Additionally, decreased intestinal motility is assessed by clinical signs such as abdominal distention or reduced or absent bowel sounds.

All features associated with MC are nonspecific. As always, alternative and precipitating diagnoses should be considered. Consult with an endocrinologist where available for concerns or questions.

WHY USE

Myxedema coma is a rare, life-threatening manifestation of severe hypothyroidism. Yet, diagnosis is primarily clinical without any universally accepted diagnostic criteria. This score is the first calculator available to assist with recognizing MC. High scores on this calculator guide urgency and warrant immediate intervention for thyroid care, and moderate scores can identify at-risk patients for close monitoring.

II. NEXT STEPS

Advice

There are no objective, widely-accepted diagnostic criteria to define MC. All of the clinical features associated with MC are nonspecific, and this scoring system is limited by the small number of patients from which it was derived. Therefore, it is important to prioritize clinical judgment and avoid overreliance on scoring. Where available, an endocrinology consult is warranted.

Management

When the thyroid labs, clinical picture, and myxedema score calculator are consistent with MC (>60 or >25 with high degree of suspicion), prompt steroid and thyroid treatment are indicated.²

Due to the risk of concurrent adrenal insufficiency, obtain a random cortisol level prior to the initiation of treatment. Then, start IV hydrocortisone 100 mg every eight hours (this may be stopped if adrenal insufficiency is ruled out). After steroids are given, provide an initial bolus of 200-400 mcg of IV levothyroxine, followed by 50-100 mcg IV daily until the patient is tolerating oral medication.² This dose may need to be reduced for patients who are older adults, have lower weight, or have cardiac history given the risk of cardiac complications such as arrhythmias or myocardial infarction.

Along with levothyroxine, some experts also recommend to administer liothyronine 5-20 mcg IV once, followed by 2.5-10 mcg every eight hours until the patient is stable and clinically improved.² Similarly, this dose may need to be reduced for patients who are older adults, have lower weight, or have cardiac history given the risk of cardiac complications. One reasonable approach is to start with levothyroxine monotherapy and add on liothyronine if there is clinical deterioration or persistent bradycardia.

Once treatment has started, continue to monitor free T4 every 1-2 days to confirm that the therapy is working. For patients on liothyronine, monitor total T3 every 1-2 days as well, ideally measured at the trough before the next liothyronine dose to assess steady-state exposure and avoid transient elevation.

Critical Actions

In addition to glucocorticoid and thyroid hormone replacement medications, take immediate steps to stabilize the patient, including intensive care admission, airway support, fluid management to address any hypovolemia, passive rewarming for hypothermia, electrolyte replacement for abnormalities, and identify and treat any triggers such as infection.

III. EVIDENCE

Evidence Appraisal

This myxedema coma diagnostic scoring system proposed by Popoveniuc et al. (2014) was derived and validated through a retrospective cohort study combining institutional data and literature cases.¹ The authors analyzed 21 adult patients (14 with MC, 7 suspicious for but ultimately classified as non-MC) from their institutions. The scoring system incorporated the following domains:

- thermoregulatory dysfunction
- central nervous system effects
- cardiovascular dysfunction
- gastrointestinal findings
- metabolic disturbances
- presence of precipitating event

All 14 MC patients scored ≥ 60 , while all but 1 non-MC control scored 25-50. Logistic regression showed each 1-point score increase raised MC odds by 9% (OR 1.09, 95% CI 1.01-1.16). A cutoff of ≥ 60 was 100% sensitive and 85.7% specific for MC diagnosis, with an AUC of 0.88 (95% CI 0.65-1.00).

For validation in the same study, the score was tested on 22 additional MC cases from the literature, of which 16 (73%) scored ≥ 60 and the remaining 6 (27%) scored 45-55. Another single-center retrospective cohort study of 41 patients with MC found that a myxedema coma diagnostic score >90 was associated with significantly higher mortality rates (OR 11.8, $p=0.026$), while a score of >110 had 100% mortality.³ These findings, while still limited to small patient cohorts, suggest that the myxedema score may also serve as a predictor of mortality in MC.

This calculator presents the first diagnostic tool for MC, a rare and life-threatening condition, and integrates both clinical and laboratory parameters to aid in diagnosis. Despite its utility as a pragmatic clinical tool, several limitations should be noted. The scoring system was derived retrospectively from a small sample size of 21 patients, and both the derivation and validation cohorts are subject to potential selection bias. Given these limitations and the absence of prospective validation, the results warrant cautious interpretation and future research is needed for further validation in diverse patient populations.

Formula

The myxedema coma diagnostic score is calculated by totaling the points from multiple clinical factors.

Variable	Points
Thermoregulatory Dysfunction	
Temperature, °C (°F)	>35 (>95)
	32-35 (89.6-95)
	<32 (<89.6)
Central Nervous System Effects	
Somnolent/lethargic	Absent
	Present
Obtunded	Absent
	Present
Stupor	Absent
	Present
Coma/seizures	Absent
	Present
Gastrointestinal Findings	
Gastrointestinal findings	Absent
	Anorexia/abdominal pain/constipation
	Decreased intestinal motility
	Paralytic ileus
Precipitating Event	
Precipitating event [†]	Absent
	Present
Cardiovascular Dysfunction	
Bradycardia	Absent
	Heart rate 50-59
	Heart rate 40-49
	Heart rate <40
Other electrocardiogram changes*	Absent
	Present
Pericardial/pleural effusions	Absent
	Present
Pulmonary edema	Absent
	Present
Cardiomegaly	Absent
	Present
Hypotension	Absent
	Present
Metabolic Disturbances	
Hyponatremia	Absent
	Present
Hypoglycemia	Absent
	Present
Hypoxemia	Absent
	Present
Hypercarbia	Absent
	Present
Decrease in glomerular filtration rate	Absent
	Present

*QT prolongation, bundle branch blocks, non-specific ST-T changes, heart blocks, or low voltage complex.

[†]E.g., infection, cold exposure, medication nonadherence, gastrointestinal bleeding, congestive heart failure or myocardial infarction, cerebrovascular accident (stroke), trauma, surgery**

FACTS & FIGURES**Interpretation**

Myxedema Coma Diagnostic Score	Myxedema Coma Diagnosis
<25	Unlikely MC diagnosis

Myxedema Coma Diagnostic Score	Myxedema Coma Diagnosis
25-59	Suggestive of MC diagnosis
≥60	Highly suggestive of MC diagnosis

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