

Introduction

The purpose of this document is to inform healthcare workers about the significance of elevated serum lactate levels in both adults and children. Failure to recognise elevated lactate and to escalate care rapidly can lead to patient harm and potentially death.

Lactate is usually present in low levels in the blood and an increased lactate may indicate either a protective or a maladaptive response to shock. Current scientific literature has evolved to suggest that there are various mechanisms for increased lactate^{1,2}. This can be due to physiologic and pathologic states.

Increased lactate levels and failure to clear lactate can serve as a marker in all stages of shock. It may help detect patients who are in early stages of deterioration and have occult shock i.e. patients who are maintaining their blood pressure and may otherwise have deceptively reassuring vital signs and behaviour³.

Although most often associated with sepsis, elevated lactate may also be seen with any cause of shock (e.g. cardiogenic) or other catecholamine responses such as hyperthermia and seizures. Medications such as adrenaline infusions, salbutamol, metformin and Antiretroviral therapies can also cause high lactate levels⁴.

Lactate in deteriorating patients

Normal lactate levels are less than 1.0 mmol/L in all age groups. A lactate result greater than 2.0 mmol/L represents hyperlactatemia and is to be reviewed by a senior clinician and treatment started as advised. A lactate of 4.0 mmol/L significantly elevates the risk for both morbidity and mortality, is a Red Zone criterion and mandates a Rapid Response⁵. The inclusion of lactate as a Red Zone criterion in 2013 has not led to a significant increase in Rapid Response calls.

Key messages

1. Lactate can be a marker of emerging or actual critical illness and is associated with increased morbidity and mortality
2. Measure serum lactate in all patients with suspected or potential serious infection
3. Escalate care and where indicated, treat promptly all patients with a lactate of 2.0 mmol/L or more
4. Call a Rapid Response for any patient with a lactate of 4.0 mmol/L or more

Lessons from serious adverse event reviews show that when clinicians misappropriate the raised lactate to bad sampling technique and ignore potential clinical causes, it can lead to adverse outcomes. It is recommended that the lactate is assumed to be correct and to escalate to a Senior Medical Officer and treat the patient accordingly.

Lactate in sepsis

Serum lactate should be measured in all patients with suspected serious infection or sepsis, irrespective of perfusion status e.g. normal blood pressure or normal appearance⁶.

Sepsis is a life-threatening condition that results from organ dysfunction due to infection and is responsible for 20% of all hospital deaths⁷. A diagnosis of sepsis should be considered in any patient with an acute illness or clinical deterioration that may be due to infection.

Sepsis is a time-critical medical emergency and prompt recognition and treatment is essential in improving survival rates.^{8,9,10} Lactate measurement is incorporated in the CEC adult, maternal, newborn and paediatric sepsis pathways.

Frequently asked questions

Do I need a venous or arterial blood sample?

Obtaining a venous blood sample is often easier and less painful for the patient. Studies show that both venous and arterial blood can be used for lactate testing².

Do I need to take the tourniquet off before drawing a venous sample?

No. The blood should be drawn within 2 minutes of the tourniquet being applied, as lactate levels can be elevated with prolonged application. If the blood is not drawn within two minutes, remove the tourniquet and wait for at least two minutes to allow the blood supply to recirculate and then reapply the tourniquet and take the sample.

Once the blood is drawn, do I need to take any measures to preserve the sample?

Ideally, a sample for Point of Care Testing (PoCT) needs to be tested immediately on the blood gas analyser. If the test is delayed longer than 15 minutes, it is recommended a fresh sample be collected for testing. If this is not possible, a grey-top tube (fluoride oxalate) can stabilise the sample for later testing.

Immersing a sample in an ice slurry is not recommended as it can affect other critical results.

Is point of care testing accurate?

Point of care testing is accurate provided validated equipment is used, users are trained, and a quality control system is in place. Your local pathology laboratory can advise on this.

What should I do if I think the lactate result is falsely elevated?

Repeat the blood test in 30 minutes to confirm the result. If the patient is unwell and has a known or suspected infection, you should consult a senior clinician and start sepsis treatment as per the relevant sepsis pathway without waiting for the result.

Factors that lead to falsely elevated lactate results on blood gas analysers include; Contamination of the sample with IV fluids e.g. Hartmann's solution, prolonged tourniquet use or delay in testing (>15 minutes).

References

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