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Critically Appraised Topic
Journal Club **LITERATURE SEARCH - EVIDENCE**
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P: In patients with evidence of sepsis
I: Does the use of serial serum lactate levels
C: Compared to ScvO2 through CV Line
O: Impove diagnostic accuracy, trending of patient progress, decrease complications (lines)

Study	Type	Patients	Results	Conclusions	Study Weakness
Early lactate clearance is associated with improved outcome in sepsis and septic shock. Nguyen et al. *Critical Care Medicine*, Vol. 32, No. 8, 2004	Prospective observational study	111 ED pts with sepsis - Suspected infection - Age > 18 - 2/4 SIRS + sBP< 90 after IVFs - Or 2/4 SIRS + lactate > 4 - ICU admission	- Survivors lactate clearance of 38.1% vs. non-survivors 12.0% - P = 0.005 - **Lactate clearance has significant inverse relationship with mortality, P= 0.04** - **11% decrease in mortality for each 10% increase in lactate clearance** - **Pts with lactate clearance >10% had greater decrease in APACHE II score at 72 hrs and lower mortality rate at 60 days, P= 0.007**	- Higher lactate clearance is associated with lower mortality	- Observational study, can detect association between lactate clearance and mortality but cannot establish cause/effect - Used all-cause in-hospital mortality, some may have died of non sepsis-related causes
Multicenter study of early lactate clearance as a determinant of survival in patients with presumed sepsis. Arnold et al. *Shock*, Vol. 32, No. 1, 2009	Prospective observational study	166 ED pts with sepsis Inclusion: - Suspected infection - Age >17 - 2+ systemic inflammation criteria - sBP< 90 after	- 15/166 **pts (9%) did not "clear"** lactate within 6 hrs - **In-hospital mortality in that group 60%** - vs **19% in group that did clear** - **P <0.001** - **Target ScvO2 > 70%** achieved in 148/166 pts (89%) - **85% clearance gp vs. 79% non clearance gp, P=0.84**	- Failing to clear lactate = high risk of death - Yet, majority of those who didn't clear and were thus at high risk of death had "at goal" ScvO2 values - Lactate clearance <10% better predictor of mortality than ScvO2 < 70%	- Same as above, cannot establish causality - In-hospital mortality is all-cause - Didn't take into account underlying co-morbidities

		fluid challenge - or initial lactate > 4 - ICU admission	=> discordance ** - Lactate strong independent predictor of in-hospital mortality with OR 4.9 (CI 1.5-15.9) - vs. OR 2.7 for max ScvO2 < 70% (CI 1.1-7.6)		
The incidence of low venous oxygen saturation on admission to the intensive care unit: a multi-center observational study in the Netherlands Van Beest et al. *Critical Care,* Vol. 12, No. 33, 2008	Prospective, observational study	Heterogeneous group of critically-ill pts after admission to ICU – total 340 pts Subgroup septic pts = 125 <u>NO</u> EGDT PROTOCOL	- Overall in-hospital mortality 32% - Mean ScvO2 > 70% - Mean CVP = 10.3 - Mean lactate = 3.6 - Mean APACHE score = 21.5 - **In-hospital mortality for subgroup of septic pts 26%** - **Mean ScvO2 = 74 (P < 0.01)** - **Mean CVP = 9.8 (P < 0.01)** - **Mean lactate = 2.7 (P < 0.01)** - Mean APACHE score = 20.9 (P=1) - **Rivers study, EGDT group**: - In-hospital **mortality 30.5%** - Mean **ScvO2= 48.6** - Mean **CVP = 5.3** - Mean **lactate = 7.7** - Mean APACHE score = 21.4 - In the septic subgroup, **only 1% of pts had an inadequate ScvO2 <50% like in the Rivers study**… => discordance **	- Mean ScvO2 in critically-ill patients, including pts with severe sepsis and septic shock, was normal in this study - Therefore, ScvO2-guided management for septic pt probably not very helpful	- **Obviously, limited by setting** - Done in Dutch ICUs, with different pt population and healthcare system than Rivers study - Only half the patients were admitted to the ICU from the ED and unclear what treatment they had received in the ED prior to going to ICU (study only looked at them from the time they entered ICU)

<u>CLINICAL BOTTOM LINE:</u>

1) Currently, the reference standard is ScvO2 measurement. This is being challenged, but hasn't been refuted yet. Still part of the official sepsis guidelines.
2) Lactate clearance appears to be a good marker of clinical status in sepsis and may be a reliable predictor of mortality as well.
3) Based on this non-inferiority trial, it seems like lactate clearance could replace ScvO2 measurements. However, it has some weakness and so better studies before it can become the new reference standard in sepsis management