



Quality of Care and Outcomes Assessment

A NOVEL, RISK STRATIFICATION MODEL USING BAYESIAN NETWORKS FOR CONTINUOUS-FLOW LEFT VENTRICULAR ASSIST DEVICE 90-DAY SURVIVAL

Poster Contributions

Poster Sessions, Expo North

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Background: Patient selection is critical to successful post-LVAD outcomes, but existing risk scores like Destination Therapy Risk Score (DTRS) are limited in scope. Bayesian Networks (BN) is advantageous over traditional analytical methods in using highly efficient & sophisticated algorithms which recognize complex medical relationships, thereby providing reliable predictors of clinical outcomes.

Methods: Retrospective data, including demographics, labs, hemodynamics etc. from 144 CF-LVAD pts. at 2 sites from yr 2006-11 was reviewed. Pts. were divided into 2 groups: low risk (alive 90 days post-implant) & high risk (died within 90 days). Several BNs, including Naïve Bayes (NB) & Tree-Augmented Naïve Bayes (TAN) were modeled and results compared to DTRS to assess performance.

Results: Both NB & TAN models were built from datasets using 10 most predictive variables which emerged from feature selection based on their predictive power: HCT, AST, age, HR, TPG, mean PAP, diuretics, PLT count, BUN & HGB. Both BNs consistently outperformed the DTRS (see Table) in their ability to predict outcomes, given their capacity to account for relationships between variables, learn from prior probability & tolerate missing or erroneous data elements.

Conclusion: BNs improve accuracy, kappa, sensitivity & specificity over conventional analytical methods, thereby providing a novel, superior model for risk assessment. Risk stratification models employing BNs should be the focus of a larger, prospective study.

	Naïve Bayes (NB)	Tree-Augmented Naïve Bayes (TAN)		DTRS
Accuracy (%)	89.8	89.8		72.2
Kappa	0.56	0.48		0.31
AUC (%)	79.5	83.6		65.0
	Predicted Low Risk		Predicted High Risk	
	True Positive (Sensitivity)		False Positive	
True Low Risk	NB	90.9%	NB	9.1%
	TAN	93.2%	TAN	6.8%
	Leitz-Miller	77.8%	Leitz-Miller	22.2%
True High Risk	False Negative		True Negative (Specificity)	
	NB	20.0%	NB	80.0%
	TAN	40.0%	TAN	60.0%
	Leitz-Miller	44.4%	Leitz-Miller	55.6%