

Introduction

Patients receiving mechanical circulatory support (MCS) risk development of sepsis.^{1,2} Examining risk factors for the development of sepsis and their relationships to MCS may allow improved understanding of these complications.³⁻⁴

Methods

Following institutional review board approval, patient characteristics, previously reported comorbidities and the incidence sepsis were studied in 199 patients who required 244 MCS devices from January 2017 to October 2023.¹⁻⁴ The clinical variables underwent machine learning analysis.⁵ Significant comorbidities from the ensemble models predicting sepsis subsequently underwent decision-tree analysis.⁶

Matthews Correlation Coefficient was calculated for the decision-tree analysis used in this cohort of patients. JMP Pro® 18.0 was used for all statistical analyses.

Table 1
Contingency Table of the Association of Sepsis to Congestive Heart Failure in 199 Patients receiving 244 Mechanical Circulatory Devices

	Counts (%)	Sepsis		Totals
		Yes	No	
Congestive Heart Failure	Yes	32 (23)	109 (77)	141
	No	17 (17)	86 (84)	103
	Totals	49	195	244

Figure 1
Decision-Tree Analysis of Comorbidities Associated with Development of Sepsis during Mechanical Circulatory Support

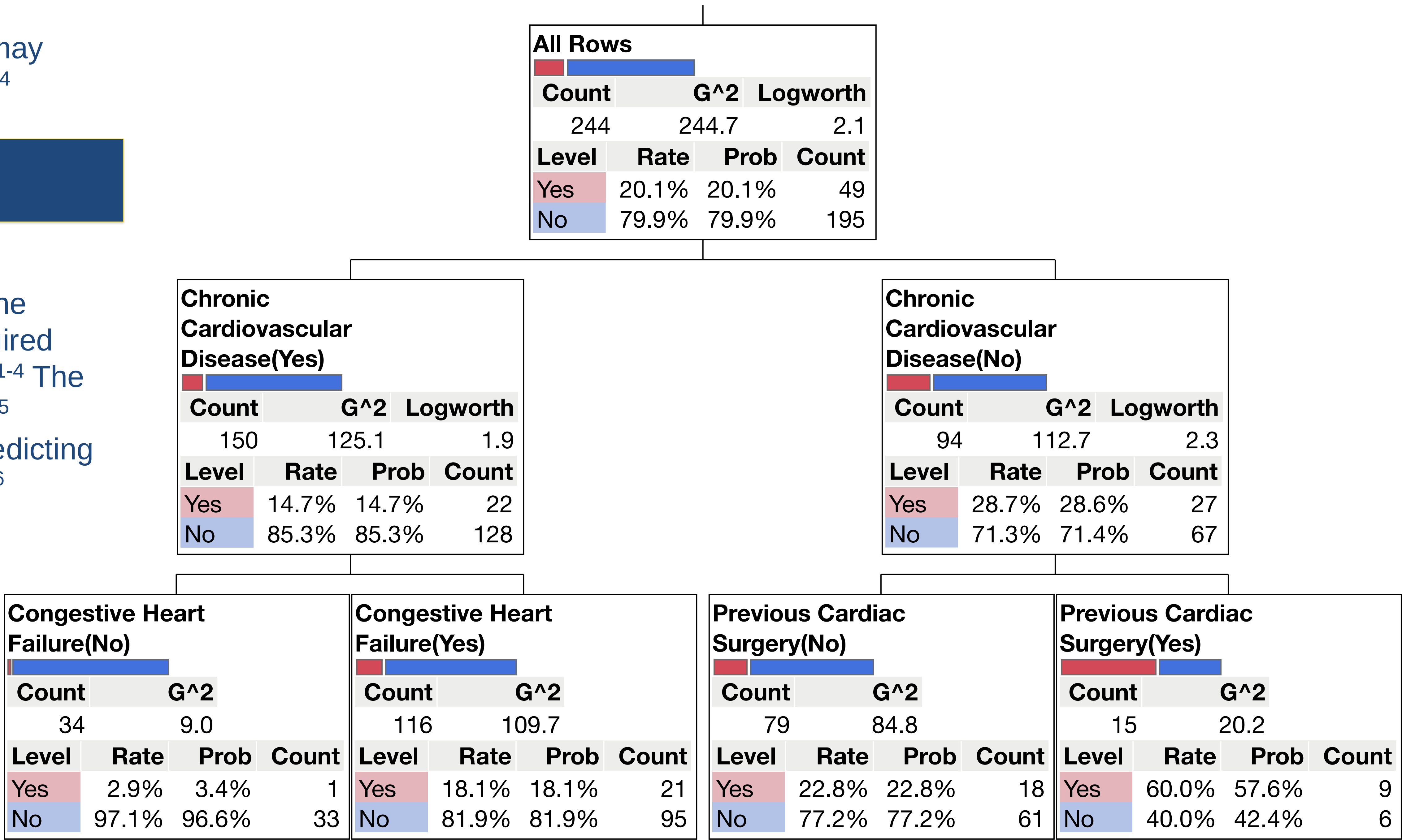


Table 2
Contingency Table of the Association of Sepsis to Previous Cardiac Surgery in 199 Patients receiving 244 Mechanical Circulatory Devices

	Counts (%)	Sepsis		Totals
		Yes	No	
Previous Cardiac Surgery	Yes	21 (26)	60 (74)	81
	No	28 (17)	135 (83)	163
	Totals	49	195	244

Results

The incidence of sepsis was 20% CI 16-26%. Following machine learning modeling, patients with a history of congestive heart failure or previous cardiac surgery were associated with an increased risk for sepsis (Tables 1-2). Decision-tree analysis observed that in patients without chronic cardiovascular disease but with a history of prior cardiac surgery have a 60.3% CI 60.1-65.2% incidence of sepsis during MCS therapy (Fig. 1). Patients with a history of chronic cardiovascular disease and with a history of congestive heart failure have an 18.1% CI 17.2-18.7% incidence of developing sepsis. The Matthews Correlation Coefficient for this model was 26%.

Conclusions

The incidence of sepsis is high in this patient population. The novel associations of patients who have histories of congestive heart failure or previous cardiac surgery requiring MCS suggest an increased systemic inflammatory state exists that escalates the risk for developing sepsis. Further investigation into these background inflammatory conditions of patients requiring MCS is warranted in this population.

References

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