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Outcome of Acute Myeloid Leukemia and High-Risk Myelodysplastic Syndrome According to Health Insurance Status

Ali Al-Ameri,[1] Ankit Anand,[1] Mohamed Abdelfatah,[1] Zeyad Kanaan,[1]
Tracy Hammonds,[1] Nairmeen Haller,[1] Mohamad Cherry[2]

Abstract

AML and high risk MDS patient outcomes in community hospital setting may vary based on health care insurance status. Ninety four patients were reviewed. Likelihood of survival in patients with Medicaid or Medicare without supplemental insurance was .552 (95% CI, .338-.903; *P* = .018) times the likelihood in patients who had Medicare with supplemental insurance. Age and risk of mortality were found to be significant predictors of survival whereas insurance did not contribute significantly to the model. Overall survival in the study was inferior as compared to national average. Early referral to a specialized center may improve outcomes.
Background: Age, cytogenetic status, and molecular features are the most important prognostic factors in acute myeloid leukemia (AML). This study aimed to analyze the outcomes of patients with AML or high-risk myelodysplastic syndrome (MDS) according to insurance status. **Patients and Methods:** A retrospective chart review was performed, covering all patients with AML and high-risk MDS evaluated and treated at Akron General Medical Center between 2002 and 2012. A Cox regression model was analyzed to account for survival over time, adjusted for insurance type, while controlling for patient age at diagnosis and patient risk of mortality. **Results:** A total of 130 adult patients (age $\geq$ 18 years) were identified. Insurance information was available for 97 patients enrolled in the study; 3 were excluded because of self-pay status. Cox regression analysis with insurance type as the predictor found that overall survival declines over time and that the rate of decline may be influenced by insurance type ($\chi^2(2)$ = 6.4; *P* = .044). The likelihood of survival in patients with Medicaid or Medicare without supplemental insurance was .552 (95% CI, .338-.903; *P* = .018) times the likelihood in patients who had Medicare with supplemental insurance. To explain the difference, variables of age, gender, and risk of mortality were added to the model. Age and risk of mortality were found to be significant predictors of survival. The addition of insurance type to the model did not significantly contribute ($\chi^2(3)$ = 3.83; *P* = .147). **Conclusion:** No significant difference in overall survival was observed when patients with AML or high-risk MDS were analyzed according to their health insurance status. The overall survival was low in this study compared with the national average. Early referral to a specialized center or possible clinical trial enrollment may be a good alternative to improve outcome.

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Introduction

Acute myeloid leukemia (AML) is a heterogeneous group of aggressive neoplasms affecting the myeloid lineage of stem cells. It

usually originates in the bone marrow with subsequent manifestation in the peripheral blood but can affect any other organ. AML is the most common type of adult acute leukemia, with a median age of 67 years at diagnosis. As the leading cause of death from leukemia in adults, AML in the setting of community hospitals is one of the most challenging diseases to manage, involving prolonged hospitalizations, high readmission rates, severe infectious complications, and highly trained nurses and house staff.[1]

The 2008 revised World Health Organization (WHO) classification of AML requires morphology, immunophenotyping, cytogenetic data, and molecular studies for proper classification and

Table 1 Demographic Data of the Study Group

Characteristic	Medicaid or Medicare Without Supplemental Insurance (n = 32)	Medicare With Supplemental Insurance (n = 38)	Private Insurance (n = 24)
% Female	42.0%	47.0%	67.0%
Age (y) at Diagnosis, Median (IQR)	80.5 (71.5-89.5)	74.5 (59.5-89.5)	61.0 (33.0-89.0)
% at High Risk for Mortality	61.0%	47.0%	25.0%
% Mortality at 200 wk	86.8%	71.9%	62.5%
Survival (wk), Median (IQR)	16.0 (0.0-73.0)	40.0 (0.0-203.5)	40.5 (0.0-163.0)

Abbreviation: IQR = interquartile range.

prognostication. Age and cytogenetic data are considered the most important prognostic factors.[2-4] Patients with AML usually undergo induction chemotherapy comprising cytarabine and an anthracycline (such as daunorubicin or idarubicin). Postremission therapy either with high-dose cytarabine or stem cell transplant is needed to achieve long-term survival. Patients are mainly divided into 3 risk groups according to their cytogenetic data: patients with inversion of chromosome 16 [inv(16)] or translocation between the long arms of chromosomes 8 and 21 [t(8;21)(q22;q22)] are considered as having favorable risk; patients with normal cytogenetic data are considered as having intermediate risk; and those with monosomies or complex cytogenetic data are considered as having high risk. Molecular testing further subdivides the intermediate-risk group into intermediate-1 (lesser risk) and intermediate-2 (greater risk). Among adverse prognostic markers, *FLT3* (fms-related tyrosine kinase 3) internal tandem duplication (*FLT3*-ITD) and *FLT3* tyrosine kinase domain (*FLT3*-TKD) mutations are particularly unfavorable, and most patients with *FLT3* mutations are destined for bone marrow transplant. By contrast, mutations in *CEBPA* (CCAAT/enhancer binding protein (C/EBP), alpha) and *NPM1* (nucleophosmin [nucleolar phosphoprotein B23, numatrin]) (and concomitant wild type *FLT3*) have been associated with favorable prognosis.[5-11,12]

Patients with AML or high-risk myelodysplastic syndrome (MDS) who have different health insurances may have different socioeconomic status, which can potentially interfere with the ability to receive appropriate treatment (such as stem cell transplant) when indicated. Literature addressing this factor in the community hospital setting is largely lacking. This report presents the results of a retrospective analysis addressing this important question.[13-16]

Patients and Methods

The authors conducted a retrospective chart review of patients with AML or high-risk MDS treated at Akron General Medical Center, Akron, Ohio, during 2002-2010. After institutional review board approval, a search identified 130 patients who had AML and high-risk MDS. Of these, 98 patients could be classified according to WHO criteria; 32 patients were excluded owing to incomplete data (mostly a lack of cytogenetic data). The majority of patients with AML were treated with 7 + 3 induction protocols. There were only 15 patients with the diagnosis of high-risk MDS according to the International Prognostic Scoring System criteria. These patients were treated with 7 + 3 or hypomethylating agents such as azacitidine or decitabine. Patient demographic data, diagnosis types/subtypes, treatment, and cytogenetic data were recorded. Patients were also classified according to the presence of health insurance coverage at the time of diagnosis. Continuous variables in comparison groups were described using means, SDs, medians, and interquartile ranges (IQRs). Categorical variables in comparison groups were described using percentages. A Cox regression model was analyzed to account for survival over time, adjusted for insurance type, while controlling for patient age at diagnosis and patient risk of mortality.

Results

Of 130 patients who had been treated, insurance information was available for 97; 3 of the 97 were excluded because of self-pay status. Of those enrolled in the study, 34.0% (32 of 94) had Medicaid or Medicare without supplemental insurance; 40.4% (38 of 94) had Medicare with supplemental insurance; and 25.5% (24 of 94) had private insurance. Insured patients were found to be at low risk for early mortality based on cytogenetic testing (53.2% vs. 46.9%). The average age of the sample population was 69.7 ± 15.1 years (median, 75.0 years), and the average length of survival after diagnosis was 75.5 ± 105.1 weeks (median, 26.0 weeks). There were equal numbers of male and female patients enrolled.

The median age of patients who had Medicare with supplemental insurance was 80.5 years (IQR, 71.5-89.5 years), versus 74.5 years (IQR, 59.5-89.5 years) for patients with Medicaid or Medicare

Table 2 Postdiagnosis Analysis of Survival Based on Type of Insurance

Cox Regression Model	Exp(b)	95% CI	P
Step 1: Adjusted by Age at Diagnosis	1.019	1.006-1.032	.005
Step 2: Adjusted by Age at Diagnosis and Risk of Mortality	1.018	1.005-1.031	.008
Block 2: Private Insurance			.158
Medicaid or Medicare Without Supplemental Insurance	.616	.333-1.138	.122
Medicare With Supplemental Insurance	.930	.491-1.762	.823