# Characteristics of Acute Promyelocytic Leukemia Hospitalizations in the United States

Aditi Sharma, MD, Jay Yang, MD and Vijendra Singh, MD
Karmanos Cancer Institute/Wayne State University, Detroit, MI, USA

## BACKGROUND

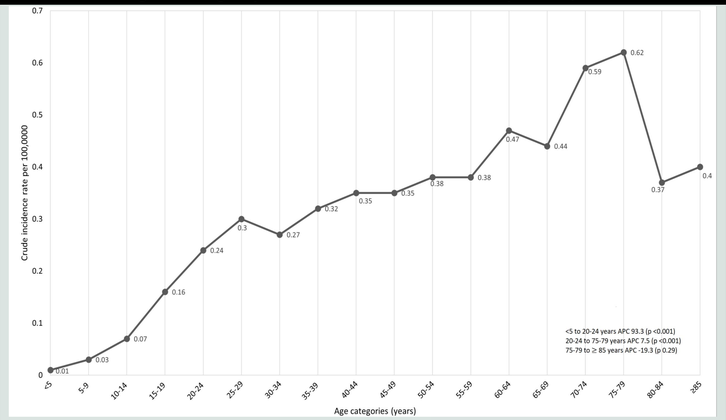
There is a lack of contemporary population-based data on the epidemiology of APL in United States. We aim to determine the epidemiology of APL, including incidence and patterns of early mortality.

## METHODS

Retrospective analysis utilizing National Inpatient Sample to identify newly diagnosed APL admissions from 2016-2019. Age-adjusted incidence rate per 100,000 US adults was estimated using the standard US population from 2000. Descriptive analysis was performed to compare ages <60 vs. ≥60 years and early (<7 days) vs. late deaths (≥7 days). Multivariable logistic regression was used to elucidate factors associated with inpatient mortality.

## RESULTS

**Figure 1: Age-specific incidence rate of APL per 100,000**




Annual age-adjusted incidence rate of APL was 0.28 (95% CI 0.26-0.30) per 100,000 persons with an APC of 4.9 (95% CI -1.2 to 11.4).

**Abbreviations:** APC, Annual percent change; APL, Acute Promyelocytic Leukemia; CI, Confidence Interval; DIC, Disseminated intravascular coagulation; IMV, Invasive mechanical ventilation; IQR, Interquartile range. [1]includes deep venous thrombosis and pulmonary embolism; [2]includes vaginal, uterine or any bleeding source other than gastrointestinal or intracranial; [3]includes skilled nursing facility, intermediate care facility & another facility

**Table 1: Baseline characters and outcomes of newly diagnosed APL**

| Baseline characteristics | Overall (N= 3,800) | Age <60 years (N= 2,425) | Age ≥60 years (N= 1,375) | p value |
|---|---|---|---|---|
| Age at admission in years, median (IQR) | 52 (35-66) | 40 (28-50) | 70 (64-76) | <0.001 |
| Female | 48% | 50.9% | 42.9% | 0.03 |
| Race | | | | |
| White | 67.7% | 60.4% | 80.8% | <0.001 |
| Black | 12.1% | 13.7% | 9.2% | |
| Hispanic | 15.3% | 20.1% | 6.7% | |
| Asian or Pacific Islander | 4.9% | 5.8% | 3.3% | |
| Primary expected payer | | | | <0.001 |
| Medicare | 27.9% | 6.1% | 64.6% | |
| Medicaid | 22.2% | 31.3% | 6.8% | |
| Private Insurance | 49.9% | 62.6% | 28.5% | |
| Hospital location/teaching status | | | | 0.01 |
| Nonteaching | 6.1% | 4.3% | 9.1% | |
| Teaching | 94% | 95.7% | 90.9% | |
| Charlson comorbidity index | | | | <0.001 |
| ≤2 | 48.2% | 59% | 29.1% | |
| 3-4 | 35.1% | 33.4% | 38.2% | |
| >4 | 16.7% | 7.6% | 32.7% | |
| Coexisting conditions | | | | |
| Coronary artery disease | 12.6% | 6.0% | 24.4% | <0.001 |
| Arrhythmia and heart block | 33.4% | 29.3% | 40.7% | 0.001 |
| Obesity | 22.8% | 25.6% | 17.8% | 0.02 |
| Venous thromboembolism[1] | 11.2% | 11.1% | 11.3% | 0.96 |
| Acute kidney injury | 22.6% | 15.1% | 36.0% | <0.001 |
| Septic shock | 5.4% | 4.5% | 6.9% | 0.16 |
| Gastrointestinal bleeding | 10% | 8.5% | 12.7% | 0.06 |
| Intracranial hemorrhage | 11.1% | 10.7% | 11.6% | 0.71 |
| Other bleeding[2] | 8.6% | 11.3% | 3.6% | <0.001 |
| Ischemic stroke | 6.1% | 4.3% | 9.1% | 0.01 |
| DIC | 41.2% | 41.4% | 40.7% | 0.85 |
| Procedure | | | | |
| IMV | 12.6% | 10.3% | 16.7% | 0.02 |
| All-cause in-hospital mortality | 12.1% | 6.4% | 22.2% | <0.001 |
| Disposition of Patient | | | | <0.001 |
| Routine | 73.3% | 81.3% | 56.6% | |
| Transfer to a facility[3] | 9.1% | 5.6% | 16.5% | |
| Home-health care | 17.6% | 13.2% | 26.9% | |
| Length of stay in days, median (IQR) | 30 (17-38) | 31 (22-38) | 25 (6-37) | <0.001 |
| Total hospital charges in US dollars, median (IQR) | 319,867 (178,842-501,677) | 341,833 (226,838-532,023) | 247,074 (80,687-466,308) | <0.001 |

## CONCLUSION

Even in the era of arsenic and all-trans-retinoic acid, APL is associated with significant in-hospital mortality specifically in non-teaching hospitals and for older patients.

**Table 2: Baseline characters of early vs. late deaths in newly diagnosed APL**

| Baseline characteristics | Overall (N=460) | Death <7 days (N= 260) | Death ≥7 days (N= 200) | p value |
|---|---|---|---|---|
| Age at admission in years, median (IQR) | 66 (56-75) | 66 (55-76) | 67 (59-72) | 0.66 |
| Female | 48.9% | 53.9% | 42.5% | 0.29 |
| Race | | | | 0.03 |
| White | 75.3% | 79.1% | 70.6% | |
| Black | 6.5% | 11.6% | 0% | |
| Hispanic | 10.4% | 7% | 14.7% | |
| Asian or Pacific Islander | 7.8% | 2.3% | 14.7% | |
| Hospital location/teaching status | | | | 0.03 |
| Nonteaching | 13% | 19.2% | 5% | |
| Teaching | 87% | 80.8% | 95% | |
| Coexisting conditions | | | | |
| Arrhythmia and heart block | 44.6% | 32.7% | 60% | 0.01 |
| Acute kidney injury | 60.9% | 44.2% | 82.5% | <0.001 |
| Septic shock | 22.8% | 11.5% | 37.5% | 0.003 |
| Gastrointestinal bleeding | 17.4% | 15.4% | 20% | 0.58 |
| Intracranial hemorrhage | 32.6% | 32.7% | 32.5% | 0.98 |
| Other bleeding[2] | 8.7% | 0% | 20% | 0.001 |
| DIC | 62.0% | 51.9% | 75% | 0.02 |
| Acute respiratory failure | 71.7% | 61.5% | 85% | 0.01 |
| IMV use | 68.5% | 71.2% | 65% | 0.53 |
| Time to death in days, median (IQR) | 6 (3-15) | 3 (1-4) | 17 (9-26) | <0.001 |

**Table 3: Factors associated with in-hospital mortality in newly diagnosed APL**

| Factors associated with mortality | Adjusted Odds Ratio | 95% CI (lower-upper) | p value |
|---|---|---|---|
| **Age ≥60 vs. <60 years** | **7.36** | **1.48-36.51** | **0.02** |
| Race | | | |
| White | | Reference | |
| Black | 1.62 | 0.38-6.90 | 0.52 |
| Hispanic | 0.98 | 0.17-5.83 | 0.99 |
| Asian/Pacific Islander | 0.85 | 0.13-5.83 | 0.87 |
| Insurance | | | |
| Medicare | | Reference | |
| Medicaid | 3.44 | 0.58-20.26 | 0.17 |
| Private | 2.60 | 0.83-8.17 | 0.10 |
| **Teaching vs. non-teaching hospital** | **0.30** | **0.09-0.99** | **0.05** |
| **Length of stay** | **0.84** | **0.80-0.88** | **<0.001** |
| Charlson comorbidity index | | | |
| ≤2 | | Reference | |
| 3-4 | 1.61 | 0.45-5.76 | 0.46 |
| >4 | 1.53 | 0.31-7.52 | 0.60 |
| **IMV** | **29.42** | **8.61-100.6** | **<0.001** |
| **Gastrointestinal bleeding** | **5.91** | **1.61-21.63** | **0.01** |
| **Acute kidney injury** | **10.65** | **2.87-39.53** | **<0.001** |
| Intracranial hemorrhage | 3.21 | 0.78-13.25 | 0.11 |
| Ischemic stroke | 3.56 | 0.34-37.65 | 0.29 |
| DIC | 3.15 | 1.00-9.96 | 0.051 |
| Septic shock | 1.70 | 0.24-12.35 | 0.60 |
| Coronary artery disease | 1.12 | 0.29-4.33 | 0.87 |
| Arrhythmia & heart block | 1.49 | 0.49-4.50 | 0.48 |